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THE IRON TRADE REVIEW

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"Adamite makes Repair Bills Light"

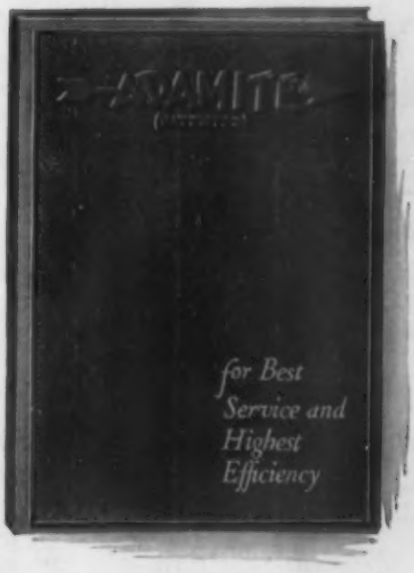
"Adamite makes Profits Right"

Machining an "ADAMITE" Roll

IN this impressive photograph you can almost see the lathe tool turning up chips on the billet roll of ***"Adamite"***—the hardest material for roll service—and the right-hand neck shows the density and quality that make ***"Adamite"*** most efficient. ***"Adamite"*** insures continuous production with minimum cost for upkeep and repairs.

The recent addition of new foundry and machine shop equipment gives us greater facilities than ever to supply promptly ***"Adamite"*** Rolls —completely or partly finished, or in the rough; and other ***"Adamite"*** castings for use where maximum service is essential—dies, guides, pinions, gears, plungers, sand mills, etc.

In the new *"Adamite"* book we describe the product and its many uses and explain why it will insure maximum efficiency in your plant—ask for a copy, and tell us which *"Adamite"* products you are particularly interested in at this time.



Pittsburgh Iron & Steel Foundries Co.

Foundries at Midland, Penna., U. S. A.

Executive and Sales Offices, Pittsburgh, Penna.

Advertisers' Index, pages 157-159. Contents, page 73. "Where-to-Buy," page 82.
Engineering Directory, pages 122-123. Classified Advertisements, pages 133-156.

WASTE

IN good beehive practice, 1000 tons of coking coal makes 630 tons of furnace and foundry coke. All of the volatile products of the coal are wasted as smoke and dirt.

CONSERVATION

IN a by-product coke plant of Koppers Ovens, 1000 tons of coking coal will produce—

660 tons of high grade furnace and foundry coke

AND

50 tons of coke breeze for boiler fuel
10,000 gal. coal tar for furnace fuel or other uses
6,000,000 cu. ft. coal gas for furnaces, etc.
26,000 lbs. of ammonium sulphate for fertilizer
2000 gals. benzol for chemical uses and motor fuel.
400 gals. toluol for high explosives.

BENEFITS

MORE coke means more iron. Coke breeze means coal saved as boiler fuel. The coal tar will replace crude oil as fuel. The gas will replace 190 tons of coal used in gas producers. The ammonium sulphate will fertilize a large acreage of corn, wheat or cotton. The benzol as motor fuel would run a car 16,000 miles. The toluol would make 5200 lbs. of T. N. T. or enough to load 8600—3" shells.

Make By-Product Coke and Save Coal

H. KOPPERS COMPANY—Pittsburgh, Pa.

Builders of By-Product Coke Plants

THE IRON TRADE REVIEW

Vol. LXII Cleveland, March 28, 1918 *No. 13*

Industry Discounts Price Changes

Reduction in Steel Works Raw Material Aimed to Favor Producers of Finishing Lines Especially in Plates—Heavy Bookings of Steelmaking Iron for Second Quarter Rewritten in Accordance with Revision Clause in Contracts

LITTLE effect upon market or producing conditions is expected from the price reductions of $1 a ton in basic pig iron, $1.10 in bessemer iron and $1 in scrap, officially announced by the President effective April 1. These reductions are in accord with those widely anticipated by the industry during the past week and to a large extent they have been discounted. The price revision has been confined to steel works raw material, in order to favor those producers of finished lines who have been working around or below cost. This especially applies to non-integrated plate producers. It is understood the government authorities considered it more advisable to reduce raw material costs to the mills than to inaugurate the granting of increases in the prices of finished steel.

The industry is much disturbed by the decision of the price committee of the war industries board to conduct continuous hearings of complaints, suggestions and requests regarding fixed prices. It is believed this will entail constant unsettlement of trade conditions and general confusion which inevitably will react upon the present orderly methods of co-operation between the industry and the government regarding prices.

Prices Cut on Bookings

A heavy tonnage of basic pig iron booked for the second quarter will be billed $1 lower on shipment to accord wih the official price reduction. This is by virtue of the revision clauses in contracts providing delivery beyond April 1, which were inserted to conform with the President's request. Considerable tonnage of second quarter bessemer also is affected by the price change. Makers of basic and bessemer are well reconciled to the reductions, which are not large enough to entail any serious realignment of their operations. From all sides reports come of an overwhelming amount of unsatified inquiry for iron especially in steel making grades. One Chicago interest was forced to turn away 150,000 tons. s viewed in that district the present pig iron situation is the tightest ever known in the northern market. At Pittsburgh it is estimated that inquiries for basic for the last half involve 250,000 tons and for foundry and bessemer not less than 100,000 tons. A Central Pennsylvania consumer has increased his purchase of low phosphorus iron to 24,000 tons. It is believed that the new price announcements may stimulate some selling for second quarter.

War Demands Far Heavier

Large steelmakers have been advised of the tremendous new requirements which the government is about to bring forth for delivery during the last half of the year both to itself and its allies. This tonnage will be made up principally of shell steel and ship material. It is expected that distribution of 3,500,000 tons of shell steel will be taken up actively next month. Of this amount, 500,000 tons will be for the allies. In addition, Great Britain is seeking a surprisingly large tonnage of ship plates on this side. As the curve of shipbuilding rises, the government is manifesting a more vigorous attitude in pushing plate shipments. The mills have been requested to limit shipments of plates to domestic buyers to 25 per cent of their full output, thereby assuring the government of a minimum of 75 per cent. Recent allotments by the Emergency Fleet corporation have reached the highest total yet and all plants capable of rolling ship plates are booked full to July 1, and in some cases to the end of the third quarter. The Submarine Boat Corp. is bringing up a new requirement of 100,000 tons of fabricated ship steel. In view of the great magnitude of the government's war demands now in sight, leading steelmakers at present can see little tonnage to be spared for the open market. Accordingly, they have adopted new selling policies which practically are equivalent to their withdrawal from the market.

Present coke prices have been reaffirmed. Some large interests, however, with sliding scale contracts for furnace coke will benefit slightly from the lower price of basic pig iron.

The Iron Trade Review.

EDITORIAL

A Method of Confusion

CONFUSION and unsettlement are spelled by the new proposal of the price-fixing committee of the war industries board to hold continuous hearings on requests, suggestions and complaints bearing upon the maximum price schedules in effect in iron and steel. In the abstract, this proposal may appear as an equitable arrangement for preserving the best interests of all concerned. In practice it is likely to prove the exact opposite.

The gratifying unanimity and co-operation which the government has enjoyed heretofore from the iron and steel manufacturers in carrying out its policy of price regulation has been due chiefly to the methods employed. To a large extent the responsibility of the carrying out and enforcement of this regulation has been placed upon the manufacturers themselves. When the government declared the suspension of the laws of supply and demand, in iron and steel was a war necessity both for itself and its allies, THE IRON TRADE REVIEW urged that price regulation be made co-operative, instead of compulsory. This in fact has been the policy pursued. The results of the past several months of market control by this plan have more than justified its soundness and practical worth. The government with a minimum of exercised authority on its part has witnessed a radical readjustment of prices and a prompt response to its every need. Friction has been altogether lacking. The iron and steel industry has more than kept the faith. The fact that the government itself has been so reluctant to order changes in the fear of upsetting interrelated prices even where probable warrant has appeared here and there, testifies eloquently how well the industry has carried out its self-imposed revision.

The basis for the complete success of the past five months of federal market control is the fact that the government has been dealing with the industry as a unit and not with integral factors. Such differences as have existed among iron and steel makers, and there have been several, have been ironed out and adjusted among themselves. Practical considerations of the broadest character have dominated these discussions. Maximum production thereby has been safeguarded and the government has got results, without disadvantage.

The proposal of the price-fixing committee to conduct an open and continuous court for weighing every complaint or demand will tend to disrupt the methods that have produced such effective relations between the government and the iron and steel industry. The committee aims to take upon itself the function of assimilating and harmonizing conflicts of interest which the industry in the past has performed for the government, largely and well. And it is only fair to say that it is far less equipped by practical knowledge and discernment to do so. In the interest of trade stability, iron and steel leaders have been pointing out the advisability of applying any fixed price schedule to a longer period than three months as at present. If the price-fixing committee now is to keep open to constant question and attack every price in effect, the unsettlement promises to be continuous and unending.

The Demand For All-Around Men

THE progressive manufacturer smiles when asked if he employs all-around machinists. He considers the all-around man as a relic of those bygone days wherein modern machine-shop efficiency was unknown. Doubtless it is true that men who are trained to do one thing and that one thing well are the most economical in the long run—hence the operator, as he is termed—the man who runs a turret lathe, manufacturing automatic, cylindrical grinder, etc.

Shortly after the United States became involved in the European conflict, the thousand-and-one industries that had secured contracts for ships and supplies demanded machinists in large numbers. Shipyards building steel vessels, especially, needed skilled machinists. Right at this point, for the first time in many years, was shown the fallacy of neglecting to develop all-around machinists.

The operators were willing enough, to be sure, but they lacked the broad training to do the necessary planning required of the all-around machinist. Many of these so-called machinists, it was discovered, were unable to read blue prints, nor could they handle such simple hand tools as the file, hammer and chisel. Thus, the few real all-around machinists that can be mustered will have to be depended upon until an army of operators can be trained to perform their new duties. The meanwhile, ships are wanted and wanted badly.

The situation is serious to say the least, and it proves that a mistake was made in neglecting our apprenticeship system of other days—a system that developed the all-around mechanic. Thus the war may serve a useful purpose in pointing out the weakness of any system which does not bring about the thorough training of young men for mechanical pursuits along broad lines of general service.

The Iron Trade Review

EDITORIAL

Steel Corporation's First Year of War

TAXES paid by the United States Steel Corp. for the 15 years elapsing between its organization and the end of 1916, amounted to $130,605,256. Twelve months later in estimating taxes for 1917 alone, the corporation set aside $252,265,695. Of this latter total $233,465,435 is designed to cover 1917 federal income, war income and excess profits taxes. The balance covers other taxes levied against the corporation and its subsidiaries.

The estimated allowance for federal taxes is $9,245,870 greater than the balance left for dividends at the close of the year's business.

These two comparisons reveal with striking clarity the extent to which the government is calling upon the country's industries to help in carrying the war's financial burden.

In general, the sixteenth annual report of the corporation contains few surprises. The financial results of the year's operations reflect, as indicated, the changed conditions produced by the country's transition from a peace to a war basis. The confusion produced by that shift, as reflected particularly in railroad conditions, led also to the drop in output shown by the report. Pig iron production fell off from 17,607,637 tons in 1916—or 45 per cent of the country's total—to 15,652,928 tons in 1917, or 40 per cent. The steel ingot production was 20,910,589 tons in 1916 and 20,285,061 tons in 1917. Output of finished products generally showed slight losses, with the plate tonnage increasing from 1,332,262 to 1,372,625 tons.

As one of the country's greatest industries and one upon which a proportionately heavy share of the country's huge war program necessarily falls, the annual report of the Steel corporation is an admirable cross section of the industrial life of the country in the first war year.

Putting Strength to the Task

WAR activities of the United States in its industrial centers are not fully appreciated by the general public, and for obvious reasons it would be foolhardy to divulge all the facts. Enough is known, however, to awaken the realization that undertakings and accomplishments are amazing. It is interesting to observe how the work is constantly branching out and progresses toward the complete systemization of a huge war machine.

In the Pittsburgh district, a production division of the ordnance department has been located; the signal corps has established offices and is building up a large organization of inspectors, chemists, machinists, etc., in connection with the work of building up the air fleet, and at one plant 1500 girls from all parts of the country are to be added to the force now engaged in making Liberty motors. These are only random manifestations of a great movement that grows daily. The vast production along essential lines of a widely varied character in that district emphasizes what the iron and steel industry is doing quietly to win the war. Indeed, the efforts that are being put forth, prompted a Canadian officer, recently returned from the trenches, to say that the war is being "won along the Allegheny river".

The industry is capable of meeting the enormous demands that being made upon it and has shown that it is determined that, if necessary, it will produce every pound possible to make this world a fit place to live in. The road looks to be a long and hard one, but it can be and will be traveled.

War Creates Home Industry

WHAT this country can do under stress of necessity along lines not attempted under normal conditions, is illustrated well by the dye situation. Three years ago the press was filled with warnings that cutting off the dyes from Germany would result in everybody wearing white clothing, and that colors would not be available to meet ordinary demands. Yet advertising in a commercial newspaper now contains the following announcements: "Blank Brand Dyes for Export. Full Line of Colors". "Full Line of Aniline Colors 'Made in America'." "Malachite Green Crystals Equal to Best Imported".

Not only has the dye industry in this country met the famine of three years ago, but it has turned it into a surplus for exporting. Under the spur of necessity, with protection from competition by the war, a highly technical industry has been built up in the United States on which depends the prosperity of a large number of persons in the textile, leather and paper manufacturing world.

Had conditions prior to July, 1914, continued without the war factor entering, this home industry would not have been created. There are many lines where development of like kind is possible. In the proportion that the nation takes advantage of these possibilities, will its future commercial position be strengthened.

Iron and Steel Prices

Corrected to Wednesday Noon

SCRAP, WAREHOUSE AND IRON ORE PRICES ON PAGE 828

PIG IRON

Bessemer, valley	$36.30
Bessemer, Pittsburgh	37.25
Basic, Pittsburgh	33.95
Basic, eastern Pa.	33.00
Basic, Buffalo	33.00
Malleable, Pittsburgh	34.45
Malleable, Chicago	33.50
Malleable, Philadelphia	34.00 to 37.50
Malleable, Buffalo	33.50

GOVERNMENT SCHEDULE

1.75 to 2.25 silicon (No. 2 foundry, No. 2 plain, and No. 3 southern), $33 furnace base.

2.25 to 2.75 silicon (No. 2X, No. 1 Northern foundry, and No. 2 southern), base plus 50c.

2.75 to 3.25 silicon (No. 1X, No. 2, soft), base plus $1.50.

Over 3.25 silicon, $34.50, plus $1.00 for each ½ per cent of silicon.

No. 1X, Phila.	35.25 to 35.50
No. 2 foundry, Pittsburgh	33.95
No. 2 foundry, Cleveland	33.95
No. 2 foundry, Ironton	33.00
No. 1 foundry, Chicago	33.50
No. 2 foundry, Chicago	33.00
No. 2X foundry, Phila.	34.25 to 34.50
No. 2X foundry N. J. tide	34.25 to 34.50
No. 2X foundry, Buffalo	33.50
No. 2 plain, Philadelphia	33.75 to 34.00
No. 2 plain, N. J. tide	33.75 to 34.00
No. 2 southern Birmingham	33.00 to 33.50
No. 2 southern, Cincinnati	36.40
No. 2 southern, Chicago	37.50
No. 2 southern, Phila. del.	38.30 to 39.40
No. 2 southern, Cleveland	37.50
No. 2 southern, Boston	39.50
No. 2 southern, St. Louis	35.90
Virginia, No. 2X, furnace	33.50
Virginia, No. 2X, Phila.	36.77
Virginia, No. 2X, Jersey City	37.02
Virginia, No. 2X, Boston	37.27
Gray forge, Pittsburgh	32.95
Silveries, 8 per cent, furnace	46.00
Silveries, 8 per cent, Chicago	48.54
Low phos. standard, Phila.	55.00 to 56.00
Low phos., Lebanon furnace	50.00
Low phos., Pittsburgh	53.00
Charcoal, Superior, Chicago	37.50
Charcoal, Superior, Buffalo	39.75
Charcoal, southern furnace	43.00

COKE

(At the ovens)

Connellsville furnace	$6.00
Connellsville foundry	7.00
Pocahontas furnace	8.00
Pocahontas foundry	8.00
New River foundry	8.00
New River furnace	7.00
Wise county furnace	6.00
Wise county foundry	7.00

FERROALLOYS

Ferromanganese, delivered.	$250.00
Spiegel, 20 per cent fur.	70.00 to 72.50
Spiegel, contracts, furnace.	70.00
Ferrocarbon titanium, carloads, maker's plant	160.00
Ferrosilicon, 50 per cent, first quarter, Pittsburgh.	180.00 to 190.00
Ferrosilicon, 50 per cent, Pitts., remainder of 1918	155.00
Bessemer ferrosilicon, 9 per cent.	$54.00
Bessemer, ferrosilicon, 10 per cent.	55.00
Bessemer ferrosilicon, 11 per cent.	58.30
Bessemer ferrosilicon, 12 per cent.	61.60

Ferrosilicon prices at Ashland, Ky., Jackson and New Straitsville, O.

SEMIFINISHED MATERIAL

BILLETS

Open-hearth, Pittsburgh	$47.50
Open-hearth, Philadelphia	50.50
Open-hearth, Youngstown	47.50
Bessemer, Pittsburgh	47.50
Bessemer, Youngstown	47.50
Forging, Pittsburgh	60.00
Forging, Philadelphia	63.00

SHEET BARS

Open-hearth, Pittsburgh	$51.00
Open-hearth, Youngstown	51.00
Bessemer, Pittsburgh	51.00
Bessemer, Youngstown	51.00

WIRE RODS AND SKELP

Wire rods, Pittsburgh	$57.00
Grooved skelp, Pitts.	2.90c
Sheared skelp, Pitts.	3.25c

SHAPES, PLATES AND BARS

(In cents per pound)

Structural shapes, Pitts.	3.00c
Structural shapes, Phila.	3.185c
Structural shapes, N. Y.	3.195c
Structural shapes, Chgo.	3.00c
Tank plates, Chicago	3.25c
Tank plates, Pittsburgh	3.25c
Tank plates, Philadelphia	3.435c
Tank plates, New York	3.445c
Bars, soft steel, Pittsburgh	2.90c
Bars, soft steel, Chicago	2.90c
Bars, soft steel, New York	3.095c
Bars, soft steel, Phila.	3.085c
Bar iron, Chicago	3.50c
Bar iron, Phila.	3.50c to 3.685c
Bar iron, Cleveland	3.64c to 3.70c
Bar iron, New York	3.695c
Bar iron, Pittsburgh	3.50c
Hard steel bars, Chicago	3.00c

RAILS, TRACK MATERIAL

Angle bars, Pittsburgh base.	3.25c
Angle bars, Chicago base.	3.25c
Standard bessemer rails, mill	$55.00
Stand. open-hearth rails, mill	57.00
Light rails, 25 to 45, mill	3.00c
Relaying rails, light, St. L.	60.00 to 67.00
Spikes, railroad, Pitts.	3.90c
Track bolts, Pittsburgh	4.90c
Track bolts, Chicago	5.115c
Tie plates, Chicago	3.25c

WIRE PRODUCTS

(Per 100 lbs. to jobbers; retailers 5c more)

Wire nails, Pittsburgh	$3.50
Coated nails, Pittsburgh	3.45
Plain wire, Pittsburgh	3.25
Galvanized wire, Pittsburgh	3.95
Polished staples, Pittsburgh	3.65
Galvanized staples, Pbgh.	4.35
Barb wire, painted, Pitts.	3.65
Barb wire, galvanized, Pitts.	4.35
Cut nails, Pittsburgh	4.00

CHAIN, PILING, STRIP STEEL

(In cents per pound)

Chain, ⅜ in. proof coil, Pitts.	8.00c
Sheet piling, base, Pitts.	4.00c to 5.00c

Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100 inch and heavier, base per 100 pounds, 6.50c.

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SHEETS

(In cents per pound)

SHEET MILL BLACK

No. 28, open-hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c
No. 28, open-hearth, Chi.	5.215c

TIN MILL BLACK

No. 28, open-hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c

GALVANIZED

No. 28, open-hearth, Pitts.	6.25c
No. 28, bessemer, Pitts.	6.25c
No. 28, open-hearth, Chi.	6.465c

BLUE ANNEALED

No. 10, open-hearth, Pitts.	4.25c
No. 10, bessemer, Pitts.	4.25c
No. 10, open-hearth, Chi.	4.465c
No. 10, open-hearth, Phila.	4.435c

TIN PLATE

(Per 100 lb. box)

Tin plate, coke base, Pitts.	$7.75

IRON AND STEEL PIPE

Base Pittsburgh

Base Pittsburgh	Black Per cent off	Galv. Per cent off
⅛ to 3 in., butt, steel	51	37½
⅜ to 3 in., butt, iron	33	17

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	30
Iron, 3½ to 4½ inches, c. l.	12½

CAST IRON WATER PIPE

(Class B Pipe)

Four-inch, Chicago	57.30
Six-inch and over, Chicago	54.30
Four-inch, New York	58.35
Six-inch and over, N. Y.	55.35
Four-inch, Birmingham	52.00
Six-in. and over, Birmingham	49.00

HOOPS, BANDS, SHAFTING

Class A pipe is $1 higher than Class B.

Hoops, Pittsburgh	3.50c
Bands, Pittsburgh	2.90c
Shafting, Pitts., carloads	17 off to list

RIVETS

Structural rivets, Pittsburgh.	4.65c
Boiler rivets, Pittsburgh	4.75c
Rivets ⅞ in. and smaller, Pitts.	45 and 10 off

NUTS AND BOLTS

(Delivered within 20-cent freight radius)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter)

Rolled thread	50–5 off
Cut thread	40–10–5 off
Larger and longer	40 off

MACHINE BOLTS

(⅜ x 4 inches, hot pressed nuts)

Rolled thread	50–10–5 off
Cut thread	50–5 off
Larger and longer	40–10 off
Cold pressed semi finished hexagon nuts ⅝ in. and larger	60–10–10 off
Cold pressed semi finished hexagon nuts ⅞ in. and smaller	70–5 off
Gimlet and cone point lag screws	50–10 off

NUTS

Hot pressed, square blank	2.50c off
Hot pressed, square tapped	2.30c off
Hot pressed, hexagon blank	2.30c off
Hot pressed, hexagon tapped	2.10c off
Cold pressed, square blank	2.25c off
Cold pressed, square tapped	2.00c off
Cold pressed, hexagon blank	2.25c off
Cold pressed, hexagon tapped	2.00c off

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago)

Quotation on leading products March 27, average for February, 1918, average for December, 1917, and average for March, 1917. Prices are those ruling in the largest percentage of sales at the dates named

	Prices March 27, 1918	Average prices Feb., 1918	Dec., 1917	Mar., 1917
Bessemer pig iron, Pittsburgh	$37.25	$37.25	$37.25	$37.45
Basic pig iron, Pittsburgh	33.95	33.95	33.95	32.85
*No. 2 Foundry pig iron, Pitts.	33.95	33.95	33.95	36.55
*No. 2, Foundry pig iron, Chi.	33.00	33.00	33.00	35.70
Lake Superior charcoal, Chicago	37.50	37.50	37.50	37.55
Malleable, Chicago	33.50	33.50	33.50	35.70
**Southern, No. 2, Birmingham	33.50	33.50	33.50	28.00
*Southern Ohio No. 2, Ironton	33.00	33.00	33.00	36.00
Basic, eastern Pa.	33.00	33.00	33.00	34.50
**No. 2X Virginia, furnace	33.50	33.50	33.50	34.00
**No. 2X foundry, Philadelphia	34.25	34.25	34.00	37.25
Ferromanganese, delivered	250.00	250.00	247.50	275.00
Bessemer billets, Pittsburgh	47.50	47.50	47.50	67.00
Bessemer sheet bars, Pittsburgh	51.00	51.00	51.00	67.00
Open-hearth sheet bars, Pitts.	51.00	51.00	51.00	67.00
Open-hearth billets, Pitts	47.50	47.50	47.50	67.00
Steel bars, Pittsburgh	2.90	2.90	2.90	3.20
Steel bars, Chicago	2.90	2.90	2.90	3.40
Iron bars, Philadelphia	3.50	3.50	3.685	3.509
Iron bars, Cleveland	3.64	3.64	3.64	3.00

*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.

	Prices March 27, 1918	Average prices Feb., 1918	Dec., 1917	Mar., 1917
Iron bars, Chicago mill	$3.50	$3.50	$3.50	$3.00
Beams, Chicago	3.00	3.00	3.00	3.65
Beams, Pittsburgh	3.00	3.00	3.00	3.45
Beams, Philadelphia	3.185	3.185	3.185	3.759
Tank plates, Pittsburgh	3.25	3.25	3.25	4.20
Tank plates, Chicago	3.25	3.25	3.25	4.60
Tank plates, Philadelphia	3.435	3.435	3.435	5.659
Sheets, blk., No. 28, Pitts	5.00	5.00	5.00	5.05
Sheets, blue anld., No. 10, Pitts.	4.25	4.25	4.25	4.70
Sheets, galv., No. 28, Pitts	6.25	6.25	6.25	6.70
Wire nails, Pittsburgh	3.50	3.50	3.50	3.15
Connellsville furnace coke	6.00	6.00	6.00	7.60
Connellsville foundry coke	7.00	7.00	7.00	6.90
Heavy melting steel, Pitts	30.00	30.00	30.00	23.40
Heavy melting steel, eastern Pa.	30.00	30.00	28.75	23.75
Heavy melting steel, Chicago	30.00	30.00	28.90	23.00
No. 1 wrought, eastern Pa.	35.00	35.00	35.00	30.50
No. 1 wrought, Chicago	35.00	35.00	34.75	28.85
Rerolling rails, Chicago	35.00	35.00	35.65	27.25
Car wheels, Chicago	30.00	30.00	30.75	20.30

(For Additional Prices See Page 828)

Steelmaking Iron Contracts Revised

Heavy Booked Tonnage of Basic Will Get Benefit of $1 Reduction in Official Price—Bessemer Readjustment Not So Large—Tremendous Amount of Inquiry Still Goes Begging—Chicago Maker Declines 150,000 Tons

Pittsburgh, March 26.—Large tonnages of basic iron sold during the first quarter will be delivered by makers in this district during the second quarter at $32, furnace, in view of the reduction of $1 made in the official prices effective April 1. Shipments of bessemer iron at the reduced figure of $35.20, furnace, will involve heavy tonnages also, but will not be as great as in basic. Producers who took business in the first quarter carried a provision in their contracts that the prices would be those prevailing at the time shipment was made, and this was in accordance with the government price-fixing program. Makers of basic and bessemer iron generally have accepted the proposed reductions without complaint. Extremely large inquiries are out for iron, especially basic, and a condition of famine exists. No sizable tonnages of any kind are available. There is considerable interest manifested as to whether furnaces which are not entirely sold up now will open their books for second quarter business. Such offerings relatively would not be large. Inquiries for basic iron in this district for last half shipment involve not less than 250,000 tons, and those for foundry and bessemer not less than 100,000 tons. The N. & G. Taylor Co., Cumberland, Md., is inquiring for 1000 tons monthly of basic for last half delivery. The Pressed Steel Car Co. has been able to obtain about 1000 tons of car-wheel pig iron from a nearby furnace to apply on its requirements of 10,000 tons. The Pennsylvania railroad has been unable to get tonnages from furnaces in this district against its last half inquiry for 13,000 tons of foundry grades. The Andrews Steel Co. inquiry for 20,000 tons of last half basic and that of the American Rolling Mill Co. for 10,000 tons of this grade for the same delivery also are reported to be still unsatisfied. Furnace production has improved as the result of better supplies of fuel. The Carnegie Steel Co. continues to operate 46 of its 59 furnaces, the same as for the past two weeks.

Inquiries are Plentiful

Boston, March 25.—There are plenty of inquiries for iron in this market but actual business is at a low ebb for it is almost impossible to unearth any nearby supplies. Pending the announcement of the new prices, effective April 1, there are few makers who are inclined to accept business. Reservations for a considerable tonnage have been placed in local offices subject to the new prices, but these cannot be counted as business until the furnaces have been consulted. Inquiries on the market for nearby iron run anywhere from carload lots of more than 1000 tons. The New Hampshire melter in the market a week ago for 1500 tons of malleable is reported to have secured about one-third of the amount needed for second half. Deliveries of iron from the Buffalo district are reported to be good and there is little complaint about shipments from Alabama, but there is little iron moving here from any of the producing sections except on special or government permits. Virginia deliveries are slow, because of the railroad congestion. Southern roads are handicapped by the recent government order to send all box cars west for moving grain;

this leaves gondolas as the only available equipment for moving iron. Shipments of Connellsville coke into this territory still are very limited, for while the car situation has improved any good that has resulted from this development has been more than offset by the maintenance of the Pennsylvania railroad embargoes.

Many Inquiries Are Out

New York, March 26.—The pig iron committee of the American Iron and Steel institute is endeavoring to place 2000 tons of bessemer for May and June shipment to Italy. Efforts are being made to place this iron in the east, but indications are that none of the eastern furnaces will be in a position to make it, so it is considered likely this iron will be placed in the middle west. Practically no pig iron business has been transacted in this district during the past week. Many new inquiries calling for lots of 1000 tons or less of foundry iron both for second quarter and second half are out, but none of the furnaces are quoting on them. Several makers, however, have quoted on 10,000 to 15,000 tons of foundry for second half, for which the Pennsylvania railroad now is in the market, and it is considered likely this business will be placed during the coming week.

Sales at Minimum

Buffalo, March 26.—The iron market is in a state of practical stagnation as far as orders are concerned. The inquiry keeps up in volume but there is no iron to be had. The development of the week in this district is that a furnace which had been disposing of tonnage rather consistently for some time back, and the only one to so do, has virtually retired from the market. This makes the "old customer" transactions the sole enlivening feature of the market. If an old customer must be appeased, producers are allowing a carload of iron or thereabouts to be sold but beyond that the coke situation has rendered business prohibitive. The coke situation is improving so slowly that the latter can hardly be said to be perceptible. Three furnace interests report a very slight improvement. With one stack out, one interest reported that it had barely enough fuel to run. Interest centers on the pending announcement of a new price schedule. The new No. 9 furnace of the Lackawanna Steel Co. should be ready in three months. There has been some improvement in the empty car situation.

Steelmaking Iron Sold

Philadelphia, March 25.—Sales of steelmaking iron again featured the pig iron market in this district during the past week. A large central Pennsylvania steel castings producer placed 12,000 tons of copper-bearing low phosphorus for second half. This interest during the preceding week placed about 12,000 tons for second, third and fourth quarters, making a total purchase of 24,000 tons. The same melter also bought 6000 tons of basic for second half. Numerous additional inquiries for steelmaking iron are out, including 6000 tons of last half and 1500 tons of second quarter basic for the N. & G. Taylor Co. Eastern makers of basic are inclined to view philosophically the reductions in the official prices of basic and bessemer. In view of the lower cost of producing basic, as compared with foundry, it is felt that the projected spread in prices is justified. It is thought it would prove a wiser policy, however, to advance foundry than to reduce basic, particularly since some of the eastern furnaces now are producing foundry at a loss. A Virginia furnace came into the market with a limited tonnage of foundry for second quarter last week and withdrew after selling all its offering. A southern furnace sold some second half foundry here. A limited tonnage of charcoal iron for second half has been sold to regular users in this district. Indications are that conditions in standard low phosphorus iron are reaching a stage where production soon will be sufficient to meet all urgent requirements.

Much Tonnage Seeks Takers

Cleveland, O., March 26.—Many inquiries but few sales still represent the pig iron market situation in this district. Makers continue to receive weekly a round tonnage of miscellaneous inquiry against which they have practically nothing to offer up to Jan. 1, 1919. Most of this proffered tonnage is in foundry with some malleable, and the lots usually are of the 500 to 1000-ton variety. The Pressed Steel Car Co. has asked for 5000 tons of foundry, half of which would be taken high in sulphur. Some of the larger malleable interests in the territory still are reported in need of considerable iron. The heavy unfilled basic requirement remains before the furnaces. Makers say they could dispose of 200,000 tons in a day's time, if they had the iron. A shortage of steelmaking iron exists in the valleys. Some of the larger interests there have attempted to buy basic from nearby furnaces without success. Even small tonnages are unobtainable. Some of the steel companies which have been short on basic but long on coke have made trades of fuel for metal with merchant furnaces. In cases the iron has been of off-basic quality. A Norwalk buyer has been figuring on 1000 tons of basic. A new government allotment is 2000 tons of foundry for a Rochester gearmaker which an eastern furnace practically has agreed to accept. A 300-ton foundry lot for a Davenport, Iowa, user has been placed. The specifications of 1000 tons of foundry for the Italian government has been changed to embrace the usual southern analysis and is expected to be filled by makers in that district. The inquiry for 2000 tons of bessemer for Italy is unplaced.

Proposed Cut Disappoints

Cincinnati, March 25.—Disappointment is displayed by producers in any proposed reduction of basic and bessemer prices by the government. While it is conceded that basic is cheaper to make than foundry iron, as far as coke costs are concerned, some well-informed iron merchants believe that the best policy should have been to encourage the production of steelmaking irons at the present time. Additional orders for foundry iron have been placed, but only the southern furnaces are able to take on business for last half shipment. Melters are now willing to buy No. 3 foundry iron, and the high sulphur iron unsold in the Birmingham district is fairly well cleaned up. The furnaces are holding considerable iron on their yards because the railroads are not able to deliver the metal. The shortage of cars and motive power is probably as serious as it was 30 days ago. However, this condition does not seem to be so acute in southern Ohio and shipments from Ironton furnaces are moving fairly well.

Chicago Turns Down Inquiry

Chicago, March 26.—Although local producers of pig iron have sold their entire production for 1918 and have not been able to take additional contracts during the past fortnight, inquiry continues strong. One interest has turned away over 150,000 tons, of which much is basic and malleable. Every effort has been made to cover requirements of regular customers who have bought here in the past. Much of the inquiry now comes from melters who have bought from southern producers previously. Under present circumstances southern iron costs a northern melter $3 to $4 per ton more than northern iron. In cases of regular customers of northern makers who require additional iron beyond their contracts, the leading interest simply is entering the order without contract and promises to do as much

as possible to ship the iron as needed, without interfering with its obligations to others. The present pig iron situation is described as the tightest condition ever known in the northern market. Some important southern makers who have been out of the market recently are expected to resume selling for second half now that a price announcement has been made. It is believed that a string may be attached to contracts, requiring melters to take an equal tonnage of iron containing 1.75 silicon or less with every purchase of regular No. 2 foundry analysis. High silicon iron is practically unobtainable. Present fuel conditions render production of high silicon iron difficult. Furnaces find it almost impossible to produce sufficient tonnage to cover their present obligations.

Consumers Are Borrowing

St. Louis, March 23.—In point of actual sales, the past week has been about the slowest this year. Both buyers and sellers are disposed to hold off, awaiting price developments at Washington. A tremendous volume of inquiries came out during the week. One user inquired for 2000 tons of high manganese iron, who never before was known to purchase that grade. The necessity of accepting pig with a high percentage of sulphur, rather than go empty-handed, has increased the need of other qualities for mixtures. Absolutely no improvement in the coke situation has developed, and at the moment it is the darkest spot on the horizon. Representatives of southern producers here are being pressed for even small quantities. The shortage of basic is the most pronounced.

Not Anxious to Sell

Birmingham, Ala., March 26.—Southern makers, with one eye on Washington in view of the revision of prices effective April 1, are giving their main attention to the production and delivery of pig iron. While there is still some selling, this is in small lots largely for last half and to regular customers. Reports to the effect that basic iron prices may be reduced did not disturb southern producers. With one exception practically all basic produced in this section is for use at home. That company with a large tonnage of basic sold ahead will not be greatly disturbed for the revision will not be retroactive in its case. Southern makers recently were requested to produce more basic but their demands for foundry were such that the request was not granted. Furnaces in southern territory continue to show increased output and there is hope now that one of the three stacks ready for blowing in will receive the torch in the next week or two.

Coke Traffic Much Better

Car Supply More Nearly Normal and Labor Situation Improves—Eastern Consumers Get More Fuel—Pennsy Embargo Lifted

Pittsburgh, March 26.—Decided improvement in the car supply in the Connellsville coke region was made during the past week. The average on the Monongahela railroad, ovens on which serve most of the independent blast furnaces, was 60 per cent, while that on the Pennsylvania railroad showed an increase of 15 per cent over the preceding week. The average supply in the entire region was larger than it has been at any time since last fall, and one of the most important features is marked improvement being shown in the placement by the Pennsylvania railroad on the Monongahela line. The supply of cars on the Monongahela again fell off today, however, and was only 30 per cent and that is the average promised for tomorrow. It is believed that this slump is only temporary and that the better showing that has been made will continue to develop. Eastern furnaces have not been benefited by the increased supply owing to embargoes which had been in effect on the Pennsylvania railroad but which were lifted last Saturday. These furnaces likely will begin to feel the beneficial effects by the end of the present week. Shipments to the Pittsburgh district and west were increased proportionately. Producers of both foundry and furnace coke insist that they are not taking any contract tonnages despite reports to the contrary. There are also only limited tonnages of spot offerings being made and most of these involve foundry grades whose shipments have been restricted to points on the Pittsburgh & Lake Erie railroad. The labor situation in the Connellsville region is more satisfactory than it has been for a long while. Coke production for the week ending March 16 totaled 335,122 tons as compared with 314,409 tons during the preceding week, according to *the Connellsville Courier*.

Deliveries Greatly Improve

Philadelphia, March 25.—Deliveries of coke have shown much improvement at consuming points all through the east. One blast furnace interest for which coke recently was requisitioned by the fuel administrator has reported that its receipts have been in excess of its requirements with the result that some of the coke now being shipped to this furnace will be diverted to other points. Fair tonnages of foundry coke have been sold here for forward delivery. No spot foundry, or spot or forward furnace coke, however, is offered.

Foundry Contracts Renewed

Cincinnati, March 25.—Some renewals of foundry contracts have been made. No new contracts are reported. Producers are trying to take care of their old customers and even now this is a difficult proposition. Shipments from the Connellsville district showed some improvement last week, but the movement of coke from others was somewhat restricted. The same old trouble involving the scarcity of cars and the inability of the railroads to move the fuel when loaded is said to be the reason for these complaints. Pocahontas furnace and foundry coke is held at $8, but there is some confusion as to whether furnace coke should be sold at the same figure as the foundry grade. No sales of furnace coke have been made from that district recently. The foundries in this territory have been able to operate without trouble lately, but they have a very short supply of coke on hand.

Accept Any Consignment

St. Louis, March 23.—The market for coke here continued as restricted as ever, the demand far outstripping available supplies. A feature has been the astonishingly poor quality of some metallurgical coke coming from the east. There are no end of complaints but the consumers none the less are accepting every car. Deliveries on contract from Connellsville and other eastern producing points are about on a parity with the preceding week, when an average of about 60 per cent of normal was reported. Dealers here have nothing to offer for near delivery, and contracts for foundry coke for any delivery are exceedingly hard to make.

Has Difficulties in South

Birmingham, Ala., March 26.—While the coal production in the south and in Alabama in particular, is noticeably larger, the coke output is not on an equal plane. Every effort is being made to produce an ample supply but the difficulties hold down the total. Furnace coke in particular is not in sufficient a supply. Chief State Mine Inspector C. H. Nesbitt announces the coal production of Alabama for 1917 to have been around 20,250,000 tons, an increase of more than 1,500,000 tons.

Scrap Prices Grow Easier

Discounting of Reduction in Official Schedule Produces General Softness—Commission Status Causes Dissatisfaction Among Sellers

FOR COMPLETE SCRAP PRICES SEE PAGE 828

Chicago, March 26.—Advance reports that $1 per ton reduction in the maximum price on iron and steel scrap will be announced for deliveries after March 31 have caused weakness in the market. This probably results from efforts of those holding some tonnage to dispose of it before the reduction goes into effect. However, general shortage of scrap is sufficient to prevent this downward change having full effect. Some consumers believe that considerable tonnages of scrap are available in many grades which have not come onto the market recently and that perhaps this situation may bring it out and ease conditions materially. The Rock Island has offered 4500 tons, including 1200 tons of rerolling rails and 500 tons of short steel rails. The Chicago, Milwaukee & St. Paul offers 900 tons and the Monon 632 tons.

Demand Shows Increase

Boston, March 25.—More open weather has resulted in quite a material increase in business between collectors and wholesale dealers in scrap. There also has been a good demand from consumers and a fairly liberal movement, thanks to better transportation facilities, of stock held up during the period of railroad paralysis. Prices are firm. Wholesale dealers' paying prices f.o.b. cars, shipping points follow: Wrought No. 1 yard long, $31; horse shoes, $31; cotton ties, $24; stove plate, $22; No. 1 machinery, $32; No. 2 machinery, $29; car axles, iron, $43; car axles, steel, $43; rerolling rails, $32; bundled barrel hoops, $21; iron boiler plate, $35; wrought iron pipe new special, $30; steel rails, $26.50; No. 1 railroad steel, $26.50; heavy melting steel, $26.50; axle turnings, $22; machine shop turnings, $16; cast borings, $16.50; drop forge trimmings, $24; cast iron car wheels, whole, $28; cast iron car wheels, broken, $32.

Prices Generally Soft

New York, March 26.—With the exception of cast scrap old materials here reflect a general weakness. This is due to the continued freedom with which supplies now are coming out. In cast scrap, the market is very firm as the heavy demand by foundries is keeping accumulations at a minimum. The foundries are paying the maximum of $35, and in some instances the 3½ per cent commission. Considerable interest prevails as to the effect the government's new price schedule will have on scrap. It is believed that one of the changes to be made will be the establishment of a lower price on heavy melting steel in the east, or a reduction, which will be equivalent to the difference in freight rates between eastern points and the Pittsburgh district. Under the present schedule, the Pittsburgh district has great difficulty in getting heavy melting steel, as dealers in the east find it more profitable to ship to the nearest consuming points. During the past few days prices on several descriptions have declined.

Heavy Steel Sold

Philadelphia, March 25.—Considerable tonnages of heavy melting steel have been bought recently by eastern steel plants direct from the producers. Just what tonnage figured is not known. With the exception of this business, the market is quiet. All the dealers have plenty of scrap to offer but in general the consumers are not keen to buy. Cast scrap and heavy melting steel are easier. Wrought continues strong. Price changes during the past week include reductions of $1 in wrought pipe and heavy axle and forge turnings, and of $2 in unguaranteed low phosphorus, No. 1 cupola malleable and cast iron borings for chemical use.

Market is Inactive

Pittsburgh, March 26.—Inactivity characterizes the market for iron and steel scrap. Dealers and brokers report that their attention is being devoted almost exclusively to making shipments on contracts. They express disappointment at the recommendation made by the war industries board and the price fixing committee that prices on regulated grades be reduced $1 a ton. They are also anxious to have announcement made as to whether or not they are to be allowed a commission on sales. A claim is made that with prices reduced and a commission denied, it will be impossible to do business. Middlemen say that they have been compelled to pay prices equal to government levels in order to obtain supplies. In the absence of a commission they say, no profit can be made and incentive for selling is entirely lacking. Assertions have been made that those who have scrap on hand have refused to sell to dealers at less than the government prices. By reason of the refusal of dealers to buy except in limited lots, heavy stocks are said to have accumulated. It is reported but not verified that there may be further classification of the different grades of scrap.

Heavy Steel is Wanted

Buffalo, March 26.—The demand for heavy melting steel continues heavy with a particular call for it from the Pittsburgh and valley districts. This demand is far from being satisfied as local producers are unable to obtain all the material they could use. There are no surplus stocks available and it is a case of its being used as fast as it is produced. Little improvement is likely in the heavy melting steel situation for some time, dealers feel. Sales of scrap now being made are subject to any increase the government makes in the price April 1 and are subject also to the increased freight rates which are to go into effect shortly. The last railroad offerings in this section were sold to consumers direct. There is no change in the regular price schedule.

Commissions Main Factor

Cleveland, March 26.—Now that it seems to be assured that the government reductions in scrap iron and steel will be uniform, jobbers here are paying less attention to the matter of actual prices than to the matter of commissions. A combination of lower prices minus a commission would be ruinous, they insist. Leaving aside all other considerations, scrap iron and steel dealers here do not view the reported $1 cut in all maximums with much apprehension. One trader here has a contract which called for the delivery of a certain tonnage prior to April 1. Though the dealer was ready to ship it and the consumer anxious for it, a railroad permit could not be obtained. On this material the dealer declares he will demand the price in effect prior to April 1 regardless of whatever reduction is commanded. Trading has been at rock bottom in the past week because of the general uncertainty. No inquiries or extensive railroad lists have been put out. Melting steel still is scarce, though not so much so as a few weeks ago.

Dealers Are Upset

Cincinnati, March 25.—Scrap dealers are in an unsettled state. The new price recommendations have proved somewhat disappointing, and the commission question is yet unsettled. It is also thought that a general reduction further will complicate the situation and tend to curtail offerings of scrap. No. 1 machine cast has been bought more freely by nearby melters. Wrought scrap would also be in much better demand if shipping facilities were better. Should

lower prices be adopted there is even some question as to whether buyers would be disposed to contract freely. Most of them would probably only buy enough to carry them until June 30, instead of through the entire year.

Prices Grow Easier

St. Louis, March 23.—There has been a softening tendency in scrap iron and steel prices here this week. The railroads have been functioning better, and receipts on contracts have picked up materially. Consumers are buying little, most of them being well supplied for immediate wants. Another bearish factor has been the uncertainty as to price fixing. Many dealers and brokers here are much discouraged at the outlook for their business. Heavy melting steel, of which there was a dearth here earlier in the month, has become more plentiful. There is a fair demand for low phosphorus scrap and some inquiries have been received for miscellaneous material. There were no railroad offerings before the market this week.

Dealers Want to Sell

Birmingham, Ala., March 26.—Dealers in iron and steel scrap in the south began seeking contracts at prevailing prices the latter part of the past week and still are anxious to sell as reports received here indicate the possibility of a downward revision of government prices. Stocks are not large but are substantial and all demands can be met. The railroad car service is improved. Steel plants in home territory are requiring large quantities of certain grades while cast iron pipe plants are not taking their usual allotment.

Domestic Trade Dwindles

Boston, March 25.—Local jobbers report a good movement of materials to plants directly or indirectly engaged on government work, but a dwindling in domestic business. This is much the same condition that has existed here for several weeks and about the only new feature is that, as a result of the more open weather, shipments are coming through in practically ante-winter fashion. One concern reported the arrival on one day recently of 12 cars of stock, some of which had been on the way east as long as 90 days. The freer arrival of material is resulting in a freer movement to users and the warehouse people are beginning to catch up with their orders. These orders, however, are sufficient to absorb most of the stock coming in and consequently warehouse stocks, outside of purely domestic lines, are still much depleted.

Plate Mills Are Filled

Fleet Corporation Allotments Reach New High Mark—Government Insists on Receiving 75 Per Cent of Full Output

Philadelphia, March 25.—The tonnage of plates placed by the Emergency Fleet corporation recently forms a larger total than any business of this character which yet has come out. It is known that as a result of this business every mill in the country capable of rolling ship plates has all the tonnage on its books that it can roll by July 1, and in many cases by the end of the third quarter. This fact was brought by efforts which vainly were made during the past week to place an additional 40,000 to 50,000 tons of ship plates which are urgently needed for second quarter. In addition to this direct government business there are all kinds of inquiries out from regular consumers. The Pennsylvania railroad wants 6000 tons of various specifications for repair purposes. Many inquiries are coming out from car and locomotive builders. Demands of fabricators who need plates for structural work for the government also are large. None of this business can be booked by the mills.

Plates Run High

CLEVELAND, March 26.—A reflection of the extraordinarily high prices for plates which prevailed before government regulation, was given by invoices covering only five plates and totaling more than $10,000 which passed through a local steel office last week. Each plate weighed about 7 tons. These shipments embraced a consignment of marine boiler steel ordered by a Canadian consumer some months ago. The billing price with extras was from 15.25c to 15.75c, mill, per pound. In connection with the shipment it was necessary to specify a fair value for the steel in the domestic market at the present time. This was shown to be 5.00c, mill.

Allies Want Big Tonnage

Pittsburgh, March 26.—Extremely heavy requirements are to be called for from platemakers for the last half of the year by the government, both for itself and its allies. England, according to reliable information, will take a surprisingly large tonnage. Platemakers continue to follow with interest the development of the government program for the purchase of large orders of cars and locomotives.

Canadian Inquiries Heavy

Buffalo, March 26.—The plate demand is fair but the fact that mills working on government orders cannot guarantee deliveries is militating against any extensive placement of commercial tonnage. One mill here which is willing to take on commitment states that on this account it is unable to say whether or not its slack will be taken up. A Canadian inquiry includes a very large tonnage of plates and bars in connection with recent government orders for railway cars. One inquiry directly by the Canadian government embraces 10,000 tons of plates. There were other inquiries sent out directly by car manufacturing companies. Emergency fleet tonnage has been allotted to Buffalo mills from time to time.

Want Production Speeded Up

Youngstown, O., March 27.—Mills in this district which are rolling ship plates for the government have been asked to speed up production by Washington authorities. If unable to attain a greater output, mill managers are requested to limit the shipments of plates to domestic buyers to 25 per cent and thus allow the government 75 per cent of production. It is estimated that 70 per cent of the output of the valley plate mills now is going into government work. One mill alone is distributing 5500 tons monthly to the various shipyards which are under government contracts. The government in order to further increase its tonnage has taken over a large tonnage of plates which the British ordered some time ago from one of the local mills. One mill in this territory is at present shut down on account of repairs.

Government Demand Grows

Chicago, March 26.—Allotments of ship material for war purposes, most of which is plates, continue to be received by all steel mills almost to the exclusion of other tonnage. The past week has not been unusual, but it is believed approximately 100,000 tons have been placed with western mills by the government during that period. This is divided as previously between fabricating shops preparing parts of ships and shipyards on salt water which do their own fabricating.

Bar Shipments Are Heavier

Western Mills Now Back to Normal Operations—Makers Well Filled Up on Bookings to Third Quarter

Pittsburgh, March 26.—Makers of both iron and steel bars are receiving an increased supply of cars and are able to make greater shipments. Producers of steel bars have been suffering considerably owing to a shortage of cars and only recently have been able to operate at better capacity. Their output now, however, continues greatly below normal. They have moved considerable tonnage that has been piled but report that they have not made much progress in the way of cleaning up live and pre-war tonnages for buyers who took bars with the understanding that makers would make shipments as rapidly as tonnages and cars became available. With the increased supply of cars makers soon will be in a position to take more new business. As it is now most of them are well filled up to the third quarter and this also represents the condition of the books of makers of bar iron. Some private business is being taken by producers of bar iron for shipment in three to four weeks. Large government orders are being received for iron bars. It is understood that the government is about ready to place its initial orders for cars in connection with its new building program and it will require a considerable tonnage of steel bars.

Inquiries More Numerous

Cleveland, March 26.—Inquiries for steel bars from the general trade, both for war and non-war requirements are more numerous. One local consumer has been seeking 600 to 800 tons for a war contract. The policy of the leading mills, however, is to accept little new business at present, both because of the steel shortage and the prospect for heavy government requirements. Makers of reinforcing bars are quoting cautiously because of the difficulty in getting rerolling rails.

Western Mills Normal

Chicago, March 26.—For the first time in its history, the Gary works of the Illinois Steel Co. is operating 12 blast furnaces, and all the 42 open-hearth furnaces are turning out steel. Other steelmakers in this territory are also operating their pig iron capacity in full and conditions are generally regarded as normal. Bar mill production consequently is heavier. Specifications on contracts are being filed in large tonnage. At the same time, other demand is decreasing. This results from the fact that most manufacturers are busy on government contracts and business of a nonwar character is comparatively small. With building operation at a minimum and railroads out of the market, a large slice of the usual demand is removed. Agricultural implement makers have been taken care of and will receive their supplies as they need them. Bar iron continues to be sold in small tonnages for prompt shipment and mills are running with sufficient business for several weeks, but nothing is being done on long-time contracts.

Prices Are Steadier

Chicago, March 26.—After a period marked by some shading of quotations on attractive orders for nuts and bolts, mostly on the part of eastern manufacturers, prices have become steadier at the prevailing level. The government is the principal customer and large numbers of bolts have been placed for war use. A western mill recently was forced to decline an inquiry for 3,500,000 bolts in one size and two lengths for fear of putting its operating schedule askew.

Moving Delayed Shipments

Pittsburgh, March 26.—Makers of nuts, bolts and rivets report that they are receiving better supplies of cars and in consequence are able to move shipments that have been delayed owing to the scarcity of rolling stock. They are operating fully and are receiving numerous orders, most of them for the government.

Shafting Orders Are Awaited

Pittsburgh, March 26.—The condition of the market for cold rolled shafting remains unchanged. The government is the chief buyer and it is understood it is about to come into the market for 20,000 tons. The 7000 tons it wants for a consumer in Ohio has been allocated but the order itself has not yet been placed.

May Consolidate Extras

Steps are being taken by the committee on iron and steel products of the American Iron and Steel institute to correct inequalities in prices on strips, hoops and bands by consolidation of the various extras into one list and the adoption of a single base price to cover all these products with proper differentials for the different qualities of steel for special purposes. Makers have ever since prices were fixed maintained that prices on these products should be made according to their own classification and that they should be removed from the steel bar card. At present bands take the same price as steel bars, 2.90c, Pittsburgh. It is asserted that handmade products in view of higher cost of production should be given a price over that asked for steel bars.

New Standards

Proposed in Ferromanganese and Spiegel to Save Vessels

New York, March 26.—Government officials at Washington last week requested that steps be taken to secure an immediate reduction in the number of manganese units in standard ferromanganese and spiegeleisen. As a result, it is expected that the American Iron and Steel institute shortly will take steps to have both producers and consumers of these alloys recognize 70 per cent ferromanganese and 16 per cent spiegeleisen as standards for the remainder of the war. This action is to increase the use of domestic manganese ore and reduce vessel requirements for bringing in foreign manganese ore. It is understood the new standards will not affect old contracts.

Active selling characterized the spiegeleisen market during the past week and fully 8000 tons of 16 per cent metal was sold, mostly for last half, with some for second quarter. The market on 16 per cent spiegeleisen now is quoted at $70, furnace.

Several sales of ferromanganese for forward delivery have been made during the week. These included 1500 tons to a Chicago consumer. The market for 80 per cent is firm at $250, delivered, for any shipment this year. On some second quarter inquiries $275 was quoted.

On 50 per cent ferrosilicon the market continues at $155, delivered, for contracts, and at $180 to $190 for spot shipment.

Heavy selling of ferrotungsten for spot delivery developed during the past week. This business went at $2.20 to $2.30 at the furnace for 70 per cent metal.

The furnace at Graham, Va., operated by John B. Guernsey & Co., was blown in on ferromanganese March 20. The output will be disposed of by Edward E. Marshall.

Talk of Fixing Prices

Pittsburgh, March 26.—Active inquiry exists for ferromanganese. A seller in

Pittsburgh sold 1000 tons to a nearby consumer for second quarter shipment at $250, delivered. The market for 50 per cent ferrosilicon is irregular. Quotations for prompt delivery vary from $175 to $190, delivered. One maker is quoting $150, furnace, for last half. A number of sales of small lots of 20 per cent spiegeleisen have been made at $70, furnace, both for prompt and second quarter. In the event prices on the alloys named are fixed the levels at which sales have been made during the first quarter it is expected, will have to be revised to meet those established by the government for second quarter delivery. Active inquiry exists for the lower grades of ferrosilicon, 10 per cent being in especially heavy demand.

Heavy Inquiry at Chicago

Chicago, March 26.—Although there is heavy inquiry for standard ferromanganese from the local stack, not much is being sold as the ore situation continues serious. It is understood the government is considering a plan to reduce the standard grade of 80 per cent ferromanganese by several points. It is probable that even with a reduction of the manganese content the price will remain the same or be higher. The present quotation appears to be $250, furnace.

Full Price

Quoted by Wire Nail Makers to Government in Competitive Bids

Pittsburgh, March 26.—Makers in this district in bids opened last Friday by the bureau of engineering, war department, to furnish 30,000 kegs of nails for shipment to France, quoted the level of $3.50 per 100 pounds, Pittsburgh, the price recommended by the committee on iron and steel products of the American Iron and Steel institute. The fact that the war department had asked that competitive bids be submitted on these requirements apparently left makers free to name quotations above or below the price of $3.50 but manufacturers felt that they were obliged to adhere to the price recommended by the institute. Distribution on this order is to be made within 15 days from the date of the opening of bids. If all makers quoted the same price, it is likely that awards will be made to those who are in a position to put their nails in kegs that require the least cargo space. Bids were opened today by the bureau of supplies and accounts, navy department, for approximately 40,000 kegs of nails and a delivered price on the basis of $3.50, Pittsburgh, was again named in these specifications by Pittsburgh makers. Makers of wire and wire products are receiving more cars.

Huge Shell Tonnage Near

Understood Government About to Act on 3,500,000 Tons—Allies to Get 500,000 Tons—Allotments Are Settled

New York, March 27.—Orders for 3,500,000 tons of shell steel for the second half will come up for action some time in April, according to reliable information. This will include 500,000 tons of shell bars and billets for the allies for shipment over the second half. The allotments to each mill for this latter tonnage are understood already to have been decided upon. Domestic requirements of shell steel for the second half also are under consideration at Washington. No definite allotments have been decided upon but it is expected that shellmakers will obtain their second half steel requirements from the mills which now are supplying them.

Strip Buying Expected

Pittsburgh, March 26.—Manufacturers of cold rolled strip steel think that buyers will come into the market soon for second quarter. Recommendations have been made to the President to continue the price of 6.50c, Pittsburgh, for the second quarter. Stocks of consumers are almost exhausted. This appears to be especially true of automobile makers. Operations of mills are irregular but at present those in this district are producing almost at capacity. Unless they are able to secure more cars, they will be compelled to curtail output.

Supply Shortage is Acute

Pittsburgh, March 26.—Shortage of tonnages of billets and sheet bars continues to be acute without any prospect of any marked change in the situation in the near future. Inquiries for tonnages are numerous but makers have no offerings, and some of them would like to obtain sheet bars from outside sources if that were possible. Producers of sheets and tin plate especially are anxious to get larger tonnages.

Receives Big Allotment

Philadelphia, March 25.—A leading eastern Pennsylvania steelmaker has been allotted an order by the authorities at Washington for 10,000 to 15,000 tons of rerolling billets which are to be exported to one of the allies. With the exception of urgent government tonnages, the semifinished market here is at a standstill. Due to their reduced operations during the last three or four months, steelmakers have fallen far behind on deliveries so that eastern consumers of semifinished steel have suffered accordingly. The situation as to supply has not eased any and the only sales reported are small ones from middle western mills. Operations at eastern steel plants have improved so that some of them are running at 90 to 100 per cent of capacity. A leading eastern steel foundry is offering 10,000 tons of large forging ingots for April delivery.

War Buying

In Cast Iron Pipe is Growing—Domestic Demand Poor

New York, March 26.—Cast iron pipe remains in fairly good demand in the east, due to the various activities of the government. Inquiries ranging in size up to 2000 tons are before the market. Much of this material is for explosive plants, while some of it is for purposes unknown. For government work in Pennsylvania 1000 tons are wanted. Another lot of 300 tons, involving 4, 6 and 8-inch pipe is for work at Governor's island. A fair-sized tonnage is pending for shipment to Mechanicsville, N. Y., this also for the government. A lot of 150 tons has been purchased by the government for delivery at Newark, N. J. Municipal demand is dull.

Operations Are Heavier

Pittsburgh, March 26.—Operations of pipe mills in this district are heavier. The A. M. Byers Co. is running its mills in Pittsburgh at capacity but is not operating its pipe mill at Columbia, Pa., which produces sizes from 2 to 4 inches, owing to railroad embargoes in the east. This maker is about two months behind in deliveries of small sizes of lap weld iron pipe. Active buying of lap weld iron and steel pipe is being made by oil country interests and there is a considerable increase in specifications for butt weld grades, jobbers being more interested in getting supplies for builders.

West Buying Little

Chicago, March 26.—Absence of inquiry for cast iron pipe continues and small tonnages which are asked for are much below usual size. Battle Creek, Mich., will open bids March 26 on 100 to 300 tons and Niagara, Wis., the same day on 142 tons. This letting was postponed from March 14. J. B. Clow & Sons, Chicago, has been awarded 250 tons for the city of Ft. Wayne, Ind.

Some Prices Cut for Next Quarter

Basic Quotations Reduced $1, Bringing Bessemer Down $1.10—Prices on Scrap Lowered $1—New Schedule for Second Quarter Only—Hearings Will be Held

Washington, March 26. (By wire.)—President Wilson has approved the new schedule of iron and steel prices for the quarter beginning April 1. After that date the maximum price on basic iron will be $32 instead of $33, the present price; bessemer pig iron will be $35.26 instead of $36.30; with a reduction of $1 on the four base grades of scrap. Other prices as fixed previously for the first quarter of this year are reaffirmed. The cut in basic resulted from the impression that the spread between this quotation and prices on semi-finished materials did not permit producers of the latter product a sufficient margin.

The official price announcement follows: The President today approved the recommendations of the price fixing committee of the war industries board that maximum prices heretofore fixed by the President upon recommendation of the board upon ore, coke, steel and steel products subject to revision on April 1, 1918, be continued in effect until July 1, 1918. From April 1 to July 1, however, the maximum price of basic pig iron is to be reduced from $33 to $32 per gross ton and the maximum price of scrap steel is to be reduced from $30 to $29 per gross ton. No new contracts calling for delivery of any of said commodities of articles on or after July 1, 1918, are to specify price unless coupled with clause making price subject to revision by any authorized United States government agency so that all deliveries after that date shall not exceed maximum price then in force although ordered or contracted for in meantime. It is expected that all manufacturers and producers will observe maximum prices now fixed.

The President's announcement disposes of the efforts made by the steel manufacturers to have prices set for a longer period than three months. The new schedule specifically applies to the second quarter only and will be reconsidered late in June. At that time cost figures now being compared by the federal trade commission are expected to play a prominent part in the deliberations.

The President's action followed the recommendations of the price-fixing committee of the war industries board. The schedule approved by this committee had been widely discussed before the President's official announcement and had provoked little surprise. The impression had been general that certain reductions were coming.

To Hold Continuous Hearings

The almost simultaneous announcement by Robert S. Brookings, chariman of the industries board's price committee, that hearings would be held to receive requests, suggestions and complaints growing out of the government's approval of maximum iron and steel prices, has aroused great interest. The committee's action may result in disturbing the harmonious arrangement under which the government and the steel industry have been co-operating during the recent months.

Want Hearings on Prices

New York, March 27. (By wire.)—Price fixing committee of war industries board has decided to conduct hearings to receive all requests, suggestions and complaints with reference to iron and steel maximum prices. Present plans are to continue these hearings as long as government prices prevail.

Leaders in steel industry feel that this method of procedure will lead ultimately to much confusion and will jeopardize continuation of orderly and harmonious arrangement by which iron and steel industry is now co-operating with government.

Favors 90-Day Plan

Efforts to get the war industries board's new price committee to recommend that the prices be continued for two quarters or longer failed, members of the committee using some of the arguments advanced by the steel men for that concession. The steel manufacturers had argued that higher costs, still mounting, should assure present prices at least for the next three months. When the request for a longer contract period was made, the committee said that prices longer than three months might work a hardship on the industry, possibly having to sell at less than cost.

Treatment Pleases

It is understood that the majority of the steel men who attended the conference last week left Washington satisfied with the decision of the price committee. It is reported many of them were pleased with the treatment given them by the government. Some of the smaller manufacturers are said to have been disappointed that the pig iron and scrap prices were not cut deeper, but on the other hand, the pig iron and scrap men were, in some instances, displeased with the small cuts that were made. The committee, however, is said to feel that it made a good showing, especially as regards the cut in scrap. It is known that some members of the committee favored even sharper declines.

Much of the time of the conference was spent in a full discussion of the steel industry, which included a general survey of costs, labor, materials, transportation, priorities, production, demands, etc. The government was again given assurance that the steel production of the country would meet requirements provided the industry is given all the co-operation possible in obtaining raw materials and cars.

Government Officials Who Attended

Robert S. Brookings, chairman of the committee, presided. Chairman Baruch of the war board, member *ex officio* of the committee, attended, as did John Hancock, paymaster, the navy's bureau of supplies and accounts; Brig. Gen. P. E. Pierce, representing the army; F. W. Taussig, chairman, the federal tariff commission; and Hugh Frayne, labor's representative on the war industries board. Dr. H. A. Garfield, fuel administrator, was unable to attend, but he was represented by Warren S. Blauvelt, coke director, and William B. Colver, member, attended for William J. Harris, chairman of the federal trade commission. The other civilian member, succeeding Judge R. S. Lovett, has not yet been appointed.

J. Leonard Replogle, director of steel supply, and H. H. Barbour, chairman of the priorities' rating committee, also attended. S. R. Fuller, in charge of steel matters for the bureau of supplies and accounts, attended with Paymaster Hancock and Francis Walker and M. W. Wooster, investigators for the federal trade commission, attended with Commissioner Colver. Jay C. MacLauchlan, handling pig iron

questions for Director Replogle, also was present at the conference.

Manufacturers Who Attended

The steel manufacturers who attended included: Judge E. H. Gary, chairman of the United States Steel Corp.; James A. Farrell, president of the United States Steel Corp.; A. C. Dinkey, president of the Midvale Steel & Ordnance Co.; E. G. Grace, president of the Bethlehem Steel Corp.; H. G. Dalton, Pickands, Mather & Co.; J. A. Burden, president of the Burden Iron Co.; E. A. S. Clarke, president of the Lackawanna Steel Co.; John A. Topping, chairman of the Republic Iron & Steel Co.; W. L. King, vice president of the Jones & Laughlin Steel Co.; L. E. Block, president of the Inland Steel Co.; James A. Campbell, president of the Youngstown Sheet & Tube Co.; James B. Bonner, vice chairman of the American Iron and Steel institute's subcommittee on steel distribution; F. J. Hall, vice president of the Central Iron & Steel Co.; J. S. Reynders, president of the American Tube & Stamping Co.; J. M. Reeves, president of the Phoenix Iron Co.; B. L. Sommers, secretary-treasurer of the Keystone Steel & Wire Co.; J. G. Deericks, general manager of sales, the Pittsburgh Steel Co.; and D. P. Bennett, vice president, the Pittsburgh Steel Co.

At a meeting with the ferroalloys committee which immediately followed the steel price conference, at which ferroalloy production was discussed, Messrs. Farrell, Clarke, Grace, A. A. Fowler, E. J. Lavino, A. D. Ledoux, Frank Samuel, E. M. Price and F. W. White, were present.

Pittsburgh Finds Changes About as Expected

Pittsburgh, March 27.—Disappointment has been expressed by some of the merchant furnace interests that the government has reduced the price of bessemer and basic iron while others say they are satisfied with the change. The recommendations have caused no surprise and they are so limited that they therefore do not call for a sweeping realignment in the industry is a source of relief to the trade. It is understood that the chief reason for the reduction in basic iron was the insistent complaints made by certain producers of plates, that the price of 3.25c, Pittsburgh, was too low and that it would either have to be increased or basic reduced. The price of bessemer iron was reduced in order to maintain the previously established differential of 10 per cent. The price of $33 on No. 2 foundry was allowed to stand apparently because it more nearly represents the differential that has existed in the past under trade custom. It now becomes $1 higher than the price of basic. It is pointed out that foundry iron cannot be produced in as large quantities in given furnaces as can basic. Moreover, foundry iron is sold in relatively small lots, whereas basic is marketed in heavy tonnages which calls for much less handling and distribution costs. Large tonnages of both bessemer and basic have been sold during the first quarter, but will not be delivered until after April 1. The price on these undelivered tonnages automatically will be reduced to the new levels.

There is a difference of opinion as to the market effect of the new price declaration. Some authorities believe it will bring out new inquiries for both iron and steel. So far as pig iron itself is concerned, the market here is well cleaned up, although some furnaces which have not committed themselves for the entire last half, it is claimed, now may be willing to do so. Some lines of steel are open to new business, including cold-rolled strip steel, steel bars, standard railroad spikes and barbed wire and nails, although buyers have been assured right along that they would be given tonnages at government prices existing at the time of shipment.

Iron Shortage

Being Felt by Valley Steelmakers—Operations Slightly Improved

Youngstown, O., March 27.—Operating conditions in this and the Greater Pittsburgh districts is slightly improved, although far below the normal output. Reports show that coke ovens are operating at 93 per cent capacity, blast furnaces at 92 per cent, open-hearths at 88 per cent, and bessemer plants at 85 per cent. Some blast-furnace managers state the reason for not making a better showing in operation is that they have not as yet been successful in getting their furnaces to take the usual volume of wind; others report either a shortage of coking coal due to the car situation or retarded coke shipments. Operators of bessemer plants say that a shortage of pig iron has greatly hampered their output. Various steel commodities piled in the yards of the steel companies in this district totals 38,000 tons. Half of this tonnage is stocked on account of the existing embargoes, and half on account of the shortage of cars. A large per cent of the steel is war material.

More Difficulty

Is Experienced by Consumers in Obtaining Sheet Tonnages

Youngstown, O., March 27.—Nearly all sheet mills are operating in this district and the output is estimated at 85 per cent. Box cars are still scarce and mill managers are experiencing trouble in making shipments. Consumers are still clamoring for all grades of sheets but find them hard to get under two months' delivery. One producer states his books are already closed for second quarter. The mills are heavy burdened with government business, the nature of which is mostly galvanized. However, light tonnages of cold-rolled black sheets have been bought by the government and will be used for powder containers. One producer has a tonnage of this material going through his mills now. One mill took on 75 tons of galvanized business for the government this past week; while tonnages ranging from 100 to 400 were booked by another mill.

Operations Are Poor

Pittsburgh, March 26.—Operations of sheet mills in this district are proceeding at a low and somewhat irregular rate. Makers are suffering from a shortage of sheet bars and cars. Great piles of stocks have been stored and are awaiting shipment, some of the tonnage being for the government. There does not appear to be any sign of any marked improvement in the car and steel supply in the near future. Sheet mills have been compelled to suffer in order that other lines may be supplied as freely as possible with cars and steel. Makers of sheets have heavy government bookings and it is understood that just at this time their output is devoted largely to this business. No new business is being taken from domestic consumers. Allotments for this trade were made early in the year for first half business on black and blue annealed sheets and for first quarter business on galvanized sheets.

Dormant Demand Heavy

Chicago, March 26.—Although comparatively little inquiry from domestic users of steel sheets is being received by western mills, indications are that a strong need for further supply exists in many lines which would come out if consumers were not satisfied of their inability to place it on mill books. The situation appears to be quiet and demand small except on the part of exporters though consumers really are in need of further supply.

Wants Much Ship Tonnage

Submarine Boat Corp. to Ask for 100,000 Tons of Fabricated Steel—Bethlehem Seeks Tonnage—Boston Development Large

Philadelphia, March 25.—The Submarine Boat Corp. is about to request bids on approximately 100,000 tons of fabricated ship steel in addition to the tonnage it placed a couple of months ago. The Bethlehem Steel Co. also requires some 10,000 to 15,000 tons of ship shapes to be used in vessel construction. The structural market again is exceedingly quiet here. The only award of any consequence is 600 tons for a boat shop at the League Island navy yard. Some railroad bridge tonnage has been placed but it was of insignificant total. Fair sized orders for plain shapes are being placed by fabricators in connection with government work. The Belmont Iron Works has taken an order for an additional 20 hangars for erection in France, making a total of 40 to this fabricator. Orders for additional hangars are in contemplation, but at the present rate of action it will require many months before the entire 2500, originally contemplated, are placed. The government contemplates building a pier and warehouses on the water front here similar to the development at Boston, but plans have not yet assumed definite form.

Terminal Tonnage Large

New York, March 26.—Much speculation prevails in the eastern structural market at this time as to the steel requirements of the proposed government terminal to be erected in Boston. Recently new plans have been considered regarding the main warehouse, which call for all-steel instead of reinforced concrete construction. As a result, about 35,000 tons of additional steel may be required. There still is a belief among some fabricators, however, that the original plan will be carried out, inasmuch as developments along that line have reached such an advanced stage. It appears to be an established fact, though, that the pier sheds will require 8300 tons, although inquiries as yet have not been issued. Other auxiliary buildings, it is believed, will be constructed of reinforced concrete. The Boston terminal, which will cost approximately $20,000,000, will be the first of several to be erected along the Atlantic coast. It is understood that while this terminal still may be erected of concrete, the others will be of all-steel construction. Current structural demand is relatively small, the bulk of buying being for government account.

Government Orders Are Heavy

Pittsburgh, March 26.—Heavy government orders of various kinds are being placed with fabricators whose operations are devoted almost entirely to this kind of business. Better supplies of cars are being received by structural mills and this has allowed them to increase operations and to make larger shipments. The domestic market is extremely dull.

Attractive Orders Declined

Cleveland, March 26.—Various inquiries of good size for plain structural shapes have been current in this district during the past week. These mainly have been for stock or manufacturing purposes, as few new building projects are coming out. One lot called for 2700 tons, another for 800 tons and the third for about 500 tons. Though the specifications were very attractive and the deliveries were made subject to mill convenience, few of the producers have shown any interest in this business. Some of the more important interests decline to quote because their supply of steel is engaged far ahead and they are anticipating heavy additional government orders. Some government contracts involving a large tonnage will probably be closed within the next two weeks.

West Builds Little

Chicago, March 26.—Demand for steel structural material is much below par and except for shipbuilding purposes comparatively little is being required. The largest tonnage placed in the west recently involves 835 tons for an agricultural pavilion for the state of California at Sacramento, which will be fabricated by the Central Iron Works.

CONTRACTS AWARDED

Agricultural pavilion for state of California at Sacramento, Cal., 835 tons, to Central Iron Works.

Addition to Mills building for the Mills Estate, Inc., at San Francisco, Cal., 295 tons, to California Steel Co.

Additional material for power house for Kansas City Light & Power Co., Kansas City, Mo., 119 tons, to independent shop.

Government explosive plant at Nashville, Tenn., 6000 tons, to American Bridge Co.

Government chemical plant at Sautville, Va., 800 tons, to McClintic-Marshall Co.

Government explosive plant at Charleston, W. Va., 1000 tons, to Nashville Bridge Co.

Addition to the plant of the Singer Mfg. Co., Elizabeth, N. J., 500 tons, to the Ferguson Iron & Steel Co., through the Austin Co., Cleveland, general contractors.

Boat shop at Philadelphia navy yard, 600 tons, to McClintic-Marshall Co.

Twenty airplane hangars to be erected in France, 750 tons to Belmont Iron Works.

Building for quartermaster general's department at San Antonio, Tex., 2500 tons to independent fabricators.

Warehouses for use of American expeditionary forces in France to Lackawanna Bridge Company.

CONTRACTS PENDING

Power house, Pier 18, for Central Railroad of New Jersey, 200 tons, bids being taken.

Addition to plant of Cleveland Brass & Copper Co., 200 tons, bids being received by Westinghouse, Church, Kerr & Co.

Marine railways at Boston and Charleston, 700 tons still pending.

Assay office at New York, 400 tons, inquiry before market.

Addition to the plant of the Linde Air Products Co., Buffalo, 200 tons, bids being taken.

Substation 13, for government, at Washington, 100 tons. Bids being taken.

Lift bridge for Boston and Albany railroad, 600 tons, bids being taken.

Building for quartermaster general's department at Baltimore, 900 tons, bids being taken.

Power house for Central Railroad of New Jersey, at Jersey City, N. J., 300 tons, bids being taken.

Office building and crane runway for Wm. Cramp & Sons Ship & Engine Building Co., 600 tons to 700 tons and 1500 to 1600 tons respectively, bids being taken.

Alterations to Hotel Imperial, New York, 1500 to 1600 tons, bids being taken.

Lake Ore Trade

To be Discussed at Meeting in Cleveland Next Week

Cleveland, March 26.—Active steps are being taken to insure the movement of a sufficient supply of iron ore on the lakes this year with a minimum tax upon the transportation facilities. General supervision over the trade will be in the hands of a central committee. To secure a clearer insight into all phases of the problem, a meeting will be held at the Hollenden hotel, Cleveland, at 10 o'clock Tuesday morning, April 2. The meeting is designed to secure a full attendance of representatives of all interests involved in the ore trade.

A. H. Smith, regional director of railroads for the eastern district, requested the institute committee on pig iron, iron ore and lake transportation to estimate the tonnage of ore which the railroads will be expected to handle during the 1918 navigation season.

The committee immediately issued the call for a general meeting of representatives of the railroads, vessels, coal shippers and ore shippers and consumers. At the meeting a free discussion will be sought in order to determine the best methods for handling the ore so that consumers will be amply supplied with the lightest

strain upon the railroads. Ore consumers, whether handling ore over their own docks or over railroad terminals, are specifically requested to attend the meeting.

Ore prices for 1918 will be the same as the 1917 figures, according to the impression generally held by the ore trade. The result of the meeting at Washington last week at which prices for the second quarter of this year were discussed, is believed to have led to the reaffirming of last year's quotations. This action was not surprising to the ore trade. Failure, however, to set ore prices for a longer period than the next quarter is disappointing as the ore trade always has been operated on a 12-month basis. The bulk of the ore tonnage for this year has either been contracted for or placed under reservation with the price subject to change in line with the action of an authorized federal agency.

Chrome Ore at Record

New York, March 26.—Prices on chrome ore have ascended to record breaking height. Several thousand tons of new Caledonian chrome ore of highest quality have sold at $2 per unit, c.i.f. seaboard. This ore, which contains around 55 per cent chromite, was sold only a few months ago at around $1.25 per unit. Considerable tonnage of new Caledonian chrome ore now is being offered c.i.f. Pacific coast at a price equivalent to about $2 per unit, delivered in the east. It is expected that additional offerings of foreign chrome ore will involve very little tonnage for some time to come, since efforts to make arrangements for ships to bring in the ore have not met with encouragement.

Many Locomotives

Virtually Arranged for by Government —The Expected Distribution

New York, March 25.—Present plans of the government are to place orders for 3000 locomotives to be delivered in time to aid in preventing traffic congestion in this country next winter. It is expected 1200 will be made by the Baldwin Locomotive Works, 1200 by the American Locomotive Co. and the remaining 600 by the Lima Locomotive Co. and other builders.

The Baltimore & Ohio has placed an order with the Jones & Laughlin Steel Co. for 1400 kegs of spikes.

Await Government Orders

New York, March 26.—Although the railroad bill has been signed by President Wilson, an allotment of orders for railroad equipment has not as yet been made by the administration. Action in this direction, however, is being expected almost daily. Simultaneously with the signing of the bill by the President, General Director McAdoo issued an order that the construction of new lines, or the extension of present facilities during the rest of the war may be undertaken only with the approval of the administration. Buying at the present time continues exceedingly dull. Included in the few orders to be placed recently is that of the Guantanamo & Western railroad involving 25 steel frame box cars. This business was placed with the American Car & Foundry Co. It is reported that the Birmingham Southern railroad is in the market for 20 freight cars.

May Fix Rail Price

Pittsburgh, March 26.—Fair demand for light rails is coming to makers in this district and good deliveries are being made on this business. The market for standard rails is dull and makers are not yet quoting for 1919 delivery. It is understood that when the government comes into the market, as it is expected soon in connection with its railroad building program, it will take large tonnages of standard rails and fix a price on them. Mills are holding themselves in readiness to take care of this business promptly. The market for standard spikes is more active and orders involving small lots are rather numerous. Makers have been giving prompt delivery on standard spikes but now are compelled to defer shipments from six to eight weeks. Pressing demand is being made for small spikes and comes chiefly from jobbers. Some makers are entirely out of the market on these sizes, while others are taking small orders for delivery at their convenience.

The Pressed Steel Car Co. has taken 50 tank cars for the Canadian government and 100 car bodies for the American Steel & Wire Co.

Mill Deliveries Slow

Chicago, March 26.—On account of heavy pressure for finished steel material for war purposes, mills are not getting out rails and track fastenings at a rate sufficient to meet the actual needs of railroads and the situation begins to assume a serious aspect. With large orders for 1918 delivery, rail makers are unable to divert sufficient steel from plates and shell rounds to keep their mills busy and meet obligations on these contracts. No inquiry for railroad cars is now current and nothing definite is heard relative to the government's proposed order for 45,000 freight cars.

Will Commandeer

Tin Plate Output, in Near Future, Makers Believe

Youngstown, O., March 27.—Reports are current that the government may commandeer the production of all tin mills in the near future. This means there will be no tin plate available for nonessentials and that the entire output of the mills will be used for food containers until an ample supply is available to care for this year's needs. Tin plate makers here are expecting such an order to be issued at any time. Mills are still handicapped in making tin plate shipments on account of the box car shortage. One valley producer which had 18 box cars in his yard waiting to be loaded, received a governmental order requesting him to free the cars so they could be forwarded to a nearby state and loaded with foodstuffs bound for France. The mills have a fair supply of pig tin on hand and report that they have not had any mills idle on account of any tin shortage. Shipments of pig tin from New York continue to arrive at intervals but in slightly decreased amounts. The production of tin plate in this district will be increased about 600,000 base boxes annually by the eight mills of the Liberty Steel Co. These, it is stated, are expected to be placed in operation by about the tenth of April.

Cut Warehouse Supplies

Pittsburgh, March 26.—A better supply of cars is available to makers of tin plate, and during the past week some plants received their entire allotments and others were able to secure their entire requirements. Allotment of cars is based on capacity, but has not been meeting the entire requirements of producers to take care of their output and at the same time make inroads on stocks they have piled. Operations are well over 90 per cent of capacity. During the past week, however, some makers have received a sufficient supply of cars to take care of both situations, and as a result there are some plants which have almost entirely cleaned up stocks they had piled in warehouses. Improvement in shipments was made throughout the industry and prospects are for a continuation of this betterment. Operations are devoted almost wholly to requirements in connection with the food conservation program. Some inquiries are coming from South America, but this business is not being taken owing to the pressing character of domestic demand.

High Wages

In Shipyards for Experienced Men Justified by Manager Piez

Indianapolis, March 26.—A defense of the attitude of the Emergency Fleet corporation toward labor was made by Charles Piez, vice president and general manager of the corporation, in an address before the Indianapolis branch of the National Metal Trades association last night. He declared that the decision of the corporation to pay wages that were so generous as to attract inexperienced workers into the shipyards not only is justified, but is wise, in view of the prime need for tonnage to meet the demands of war.

"Now 300,000 skilled men actuated by a loyal purpose will turn out between 6,000,000 and 7,000,000 deadweight tons of shipping per annum," he said; "but that number of half-skilled laborers will turn out barely half that production, necessitating either a corresponding reducing of our expected output or a vast extension of shipyard facilities. The statement that high wages reduce rather than increase output, in my opinion, cannot be substantiated. The present administration stands firmly committed to a basic day of eight hours. The application of the 8-hour day is being very widely extended and my suggestion is to those employers who are still working on a 10-hour day basis, that they had better begin an immediate reduction of hours on straight time and to adjust themselves promptly to the inevitable.

"Concerning the charge that we are playing into the hands of the unions, let me say that wage adjustment agreement under which the shipyard workers are operating has been, on the whole, a most effective instrument in adjusting labor disputes and in preventing walkouts and strikes. That the unions are extending their membership cannot be denied, but they are doing this much as a manufacturer extends his business during periods of extreme business activity. The Fleet corporation stands firmly by the principle that an equal opportunity should be extended to all.

"That the wage policy adopted by the Fleet corporation should prove embarrassing to industry is regrettable, but if industry will look on this wage increase as a war measure intended to attract workers to the most essential part of the war program, and will bear it in the same philosophic spirit in which it bore the draft, it will find that the burden will be only temporary."

Mr. Piez said that he did not want to be understood to be in opposition to wage increases in general. He declared industry has enjoyed prosperity for two years, and he asked if employers have given employes a fair share of the prosperity. He said labor is going to insist on a fairer distribution of the fruits of industry.

Enters Engineering Field

Organized by three former members of the Wellman-Seaver-Morgan Co.'s organization in Cleveland, the Hulett-Boyd Co., with offices at 301-303 Union building, Cleveland, has been incorporated under the Ohio state laws with a capitalization of $50,000. The new concern is paying particular attention to the engineering and contracting field and among other projects it already is busily engaged on work in connection with crane and pier equipment for the Submarine Boat Corp., which is building the government shipyard at Newark Bay, N. J. The company will specialize in dock equipment work, in ore and coal storage yard machinery and other heavy machinery. G. H. Hulett, inventor of the Hulett ore unloader and car dumper, and formerly vice president of the Wellman-Seaver-Morgan Co., is chairman of the board and vice president. His son, Frank E. Hulett, affiliated with the Wellman company for about 20 years, most recently as engineer in charge of coal-handling equipment, is president. C. A. Boyd, connected with the same company for the last 12 years and who for some time prior to his resignation, was works manager, is likewise vice president.

The Non-Ferrous Metals

Copper Lead Spelter Tin

New York, March 26.—The New York metal trade has felt the influence of the big German drive. Whereas, on previous big pushes statisticians were wont to figure out the amount of metal being consumed in the heavy bombardments, the appalling loss of life and the issues weighing in the balance in this crisis have repressed activity even to a narrower scale than in recent dull weeks. Inquiries have been noticeably scarce this week, even for tin, which has been in lively demand heretofore. Speculation has largely been eliminated from the metal markets and brokers and dealers are figuring only to a very limited extent in the distribution of metals, as compared with previous years. The government controls distribution of copper, tin and aluminum, among the major non-ferrous metals. The lead producers are selling the bulk of their output to the government and are disposing of exceedingly little metal through second hands. Demand for spelter is so light that there is little activity on the part either of producers or second hands. Consumption of antimony continues apparently light, while stocks are large. All in all, the New York metal trade is passing through the hardest time in years. Several smaller brokers have shut up shops and some of the larger have cut down their office forces.

Spelter prices were driven downward last week from the level at 7.50c, St. Louis, at which they had been pegged for some time, when one large producer pressed sales heavily. In the course of a few days they dropped to 7.25c, St. Louis, for prompt, March, April and May shipment, and metal might have been obtained at even as low as 7.12½c. This is the lowest level the spelter market has reached in three years. The government continues to take good sized tonnages of high grade spelter at the fixed price of 12c, St. Louis, and producers are sold up about a month ahead.

The lead smelter of the St. Joseph Lead Co. at Herculaneum, Mo., has been closed for more than a week because of labor troubles. This smelter produces about 20 per cent of the country's lead output and undoubtedly if its closing is prolonged the market will reflect the diminished output. At present the market is quiet, with producers supplying a large part of their output to the government, while sellers are not pushing sales to the general trade. Production generally has been improved with better traffic conditions and arrivals of cars at New York from the West have eased the spot situation in the East. Independent producers are shading the leading interest's quotation, asking as low as 7.12½c, New York, for prompt, March, April and May shipment. Spot is quoted 7.50c to 7.60c, New York.

The tin market has been extremely excited, with heavy demand to scarcity of supplies. Practically no offerings of spot Straits are reported. On occasional lots of Banca from 87c to 90c, New York, is being done. Chinese No. 1 and other grades of 99 per cent tin are quoted 87c. No quotations on Straits for future shipment from Singapore are reported. Chinese for March shipment from China is quoted 78.50c to 79c, c. i. f., New York; April shipment, 77c. Banca for March shipment from Batavia is quoted about 81c.

The aluminum market has become generally adjusted to the government fixed maximums and there have been few reports of violations. The maximum price for 98 to 99 per cent aluminum in 50 ton lots is 32c.

Some of the larger copper producers have sold up their output until June 1, but one or two continue to accept business. On June 1 the present price agreement of 23.50c for carload lots expires and the trade generally feels that if there is any revision it will be upward. Consequently many consumers have been led to cover their requirements until that date. However, no scarcity of copper is apparent.

Antimony in a 25-ton lot sold today at 12.-67½c, New York. Some sales were made in 50-ton lots at 12.50c, New York, recently. Holders generally have been asking about 13c, duty paid, New York.

Velocity Measured by Impact Tube

Discussion of Fundamental Principles and Proper Arrangements for Actual Tests—This Apparatus is Applicable for Measuring Pipe Pressure or Flow of Fluids—Venturi Meter Computations Needless

BY SANFORD A. MOSS

VELOCITY of gases or liquids in pipes or tubes is determined, mathematically, from the static and total pressures of the substance under consideration. These pressures are obtained by means of the well-known pitot tube which consists of a central portion called an "impact tube" pointed downstream, surrounded by a chamber in which are openings for obtaining static pressure. Properly calibrated static openings in a properly smooth jet give exactly the same readings as are given by a static pressure hole in the pipe wall where fluid flow is being measured. There are a number of positive advantages gained by discarding the common pitot tube, and using instead an impact tube and a static hole in the pipe wall.

The impact tube is valuable for many other purposes, both for incompressible fluids and for compressible fluids at high velocities. An impact tube can be used instead of a static pressure hole, in the pipe preceding a venturi meter or in an orifice discharging into atmosphere, in order to automatically take account of the initial velocity head; or it can be used to traverse the jet issuing from an orifice and so give absolute calibration and velocity coefficient, without actual measurement of volume by means of tanks, weirs, gas holders, etc.

The impact-tube law which covers all cases is that "the impact tube perfectly converts velocity into pressure," so that the pressure shown by the impact tube is exactly the pressure which will produce, with theoretical adiabatic flow, the actual velocity of the stream in which the impact tube is inserted.

The impact tube as a part of the pitot tube is well known as a means for measuring flow of fluids. When used as a separate instrument, it is a much more valuable apparatus, and has not received the attention it deserves.

Accuracy of Pitot Tube

The common form of pitot tube is a double-walled tube consisting of an impact tube pointed downstream surrounded by a chamber with openings for determining the static pressure. It is asserted that the impact portion of this tube gives reliable results, regardless of its shape. The static holes give very indefinite results and the shapes and sizes of all of the parts have influence on the static readings.

Static pressure is determined by a hole in the wall of a surface parallel to the fluid flow. Reliance cannot be placed upon readings with an impact tube, or any of the common forms of pitot tube, unless the instrument is inserted at a point where the stream is uniform. Ten to 20 diameters of straight pipe should precede the tube and about five diameters should succeed it. Hence, if we have a pitot tube which measures true static pressure, and a uniform jet, the static readings at every point across the pipe section are the same as would be given by a static hole in the pipe wall. Any measurements made by a plain impact tube in conjunction with a static hole in the pipe wall will give results identical with those given by an accurate form of pitot tube.

That an accurate form of pitot tube takes account of any slight variation there may be in static pressure from one side of a pipe to another when a traverse is made across the pipe, is not a fact. If there is any difference in the static pressure across the pipe section, the streams will not flow parallel to the pipe walls, but at various angles. Parallel flow in a pipe is only possible when the static pressure is absolutely the same at all parts of a section perpendicular to the stream. Therefore, if there is variation in the static pressure the stream angles will be such that even an accurate form of pitot tube will give erroneous results. The pitot tube offers no advantage over the combination of an impact tube and a static

From a paper presented before the American Society of Mechanical Engineers. The author, Sanford A. Moss, is engineer, turbine research department, General Electric Co., West Lynn, Mass.

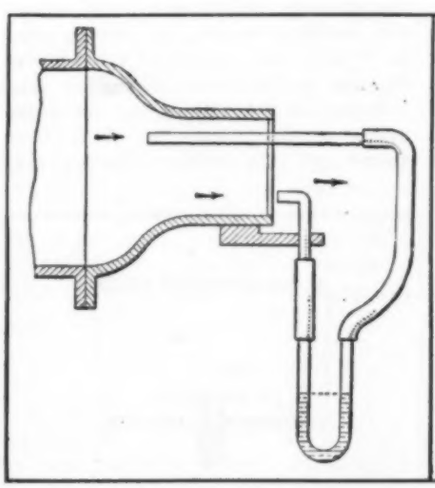


FIG. 1—CONSTANCY OF IMPACT PRESSURE OF AN ORIFICE

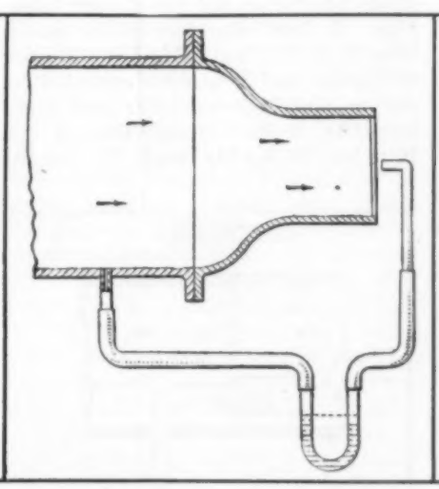


FIG. 2—EQUALITY OF IMPACT PRESSURE IN PIPE AND JET

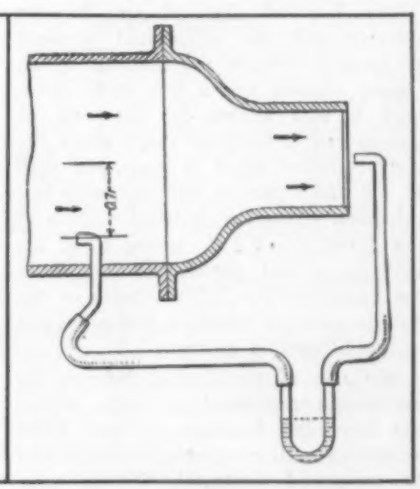


FIG. 3—VELOCITY HEAD SHOWN BY DIFFERENCE BETWEEN PIPE STATIC AND JET IMPACT PRESSURES

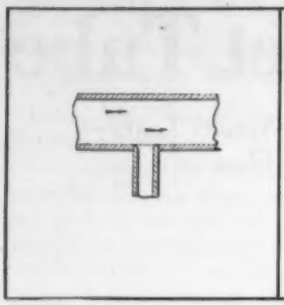


FIG. 4—SINGLE STATIC HOLE IN PIPE WALL

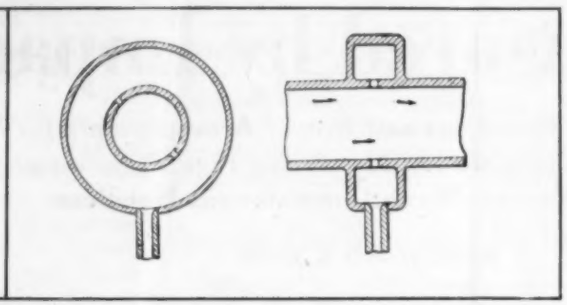


FIG. 5—RING OF STATIC HOLES IN PIPE WALL

hole in the pipe wall. It is much easier to make a reliable static hole in the pipe wall than it is to make a reliable static hole in the pipe wall than it is to make a reliable static hole in the pitot tube. The usual trouble with pitot-tube static openings is that they give too low a reading for static pressure. This increases the small differential reading between impact and static sides and indicates a quantity larger than actually exists.

All of the foregoing refers to the common form of pitot tube, consisting of an impact opening and one or more static openings in the side walls immediately adjacent. Such a tube is used to determine the flow in a pipe by means of a traverse across the stream, readings being taken at each of a number of different points. There are several forms of nozzle plugs, special pitot tubes, etc., which provide a number of holes completely across a jet. Some of these are said to average the velocities and static pressures in an irregular jet, automatically determining the flow at a single reading. The writer has had no experience in the use of such instruments for accurate work and this paper does not discuss them.

Law of Impact Tube

The law of the relation between velocity and the differential pressure (difference between the readings of an impact opening and a true static opening) is well known for the case of incompressible fluids or cases where the compressibility effect is negligible, such as air and steam at comparatively low velocities. This law is usually given in the form $V = \sqrt{2gh}$, where V is the velocity in feet per second, and h is the height, in feet, of a column of the fluid in question having a pressure equal to the differential pressure.

The use of the impact tube is by no means restricted to cases where the foregoing formula applies. High velocities with compressible fluids can be measured accurately if the complete law is used. This law is that the impact tube perfectly converts velocity into pressure. That is to say, the velocity of the fluid in front of the impact tube is exactly that which would be produced by theoretical adiabatic flow from a region where the absolute pressure is that shown by the impact tube, to a region where the absolute pressure is the static pressure. We may use the theoretical thermodynamic formulae for adiabatic flow through orifices deduced with the assumption that the initial velocity in the pipe preceding the orifice is practically zero. This law holds for steam, air, all gases, and liquids.

The flow of a gas thus computed by the thermodynamic laws for adiabatic flow is somewhat different than if computed by the incompressible fluid law, as heretofore stated. This difference is negligible if the differential pressure is a small fraction of the absolute static pressure. The error is noticeable in the case of air with a pressure of 1 pound per square inch above atmosphere and a velocity of about 50 feet per second. This error becomes more serious as the velocity increases.

The law that the impact tube converts velocity into pressure follows directly from the general law that impact pressure is constant at all points as we proceed up the stream along an orifice fed by a very large pipe. It has been known for some time that this law holds for the case of liquids, and it may be extended to the case of high velocities and compressible fluids. Demonstration of this law is readily made by means of apparatus shown in Fig. 1. A stationary impact tube is clamped at a convenient point in the jet from a convergent orifice preceded by a large pipe. An impact tube is pushed up inside the orifice. Differential pressure between the two tubes is shown by a water U-tube. It will be found that the differential pressure is zero. The law is accurate within one-quarter of 1 per cent of the orifice impact pressure.

The apparatus shows, when the pipe preceding the orifice is more than three times the orifice diameter that the jet issuing into the atmosphere has a constant impact pressure and a constant velocity at all points over its area except close to the edges.

The velocity in a long straight pipe preceding an orifice is not at all constant, but is proportional to the ordinates of an ellipse. The velocity is a maximum in the center and gradually decreases toward the sides of the pipe. When this pipe velocity, compared with the spouting velocity, is insignificant. Fig. 1 shows that static pressure in the pipe preceding the orifice plus the average velocity head at this point is equal to the jet—impact pressure issuing from the orifice. The sum of the initial static pressure and the average velocity head in the pipe preceding the orifice is given by an impact tube placed at such a radius as to give the average velocity head. If this pipe is quite large, the velocity head has the average value at a point of a periphery, the radius of which is about 0.7 of the radius of the pipe. A water U-tube, arranged as in Fig. 2, reads zero, while the water U-tube, shown in Fig. 3, reads the average velocity head in the pipe preceding the orifice.

Importance of Orifices

Where the final pressure of a compressible fluid is greater than half the initial pressure, an orifice must be wholly convergent as in the case of an incompressible fluid. The velocity of the jet issuing from the orifice is less than the velocity of sound and the impact-tube laws, as

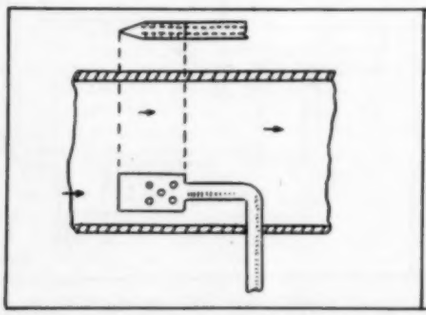


FIG. 6—STATIC PRESSURE BOAT

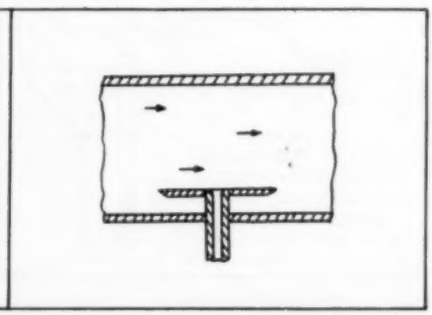


FIG. 7—STATIC PRESSURE BY SIDE GAGE

well as the work with impact tubes here discussed, apply only to such cases. When the final pressure of a gas is less than half the initial pressure, the orifice of a pipe must be first convergent and then divergent. The writer has not carefully investigated impact tubes in such cases. There is an indication that the impact tube does not convert velocity into pressure with an efficiency of 100 per cent. It is asserted that with a final pressure less than half the initial pressure, and with a wholly convergent nozzle (a shape which does not give full theoretical velocity), the impact pressure in the jet close to the end of the orifice is equal to the initial pressure. It is known in this case that the static pressure of the jet is about 52 per cent of the initial pressure for air, and 58 per cent for steam, notwithstanding the pressure of the region into which the jet discharges, and that the jet velocity is the velocity of sound. The jet forms stream lines. This creates an extension of the orifice and represents a divergent portion where pressure decreases to the pressure of the surrounding region and where velocity increases from velocity of sound to a somewhat greater value. This value is less than one obtained with a properly-shaped orifice.

A gas in a closed envelope consists of a number of molecules oscillating at high velocities. A gas flowing in a pipe consists of molecules with velocities such that the average velocity down stream has a definite value, the velocities across the stream cancelling so that the average is zero. When gas is flowing from a large vessel through a properly-shaped orifice into a region of lower pressure, the molecules in the jet issuing from that orifice are really in the same condition as those in the vessel, except that there is a general net velocity which we call the velocity of the jet. The net velocity is at once destroyed if anything is inserted in the jet. The molecules immediately in front of the impact tube in a discharge jet are in exactly the same condition as those in the large vessel from which the gas issues. Hence, the impact tube in the jet must measure the same pressure as would a static hole in the pipe wall of the large vessel.

Impact Temperature

A similar situation occurs if a thermometer is placed in a high-velocity jet in an attempt to measure its temperature. The molecules surrounding the thermometer are immediately restored to the same condition as those in the large vessel from which they originally proceeded. A thermometer inserted in a high-velocity jet issuing from an orifice will give nearly the same reading as a thermometer in the large vessel from which the jet discharged. An interesting experiment can be performed with an orifice discharging steam with an initial pressure of about 25 pounds per square inch absolute into the atmosphere and with the initial steam slightly wet. The laws of adiabatic expansion show that the steam in the jet issuing from the orifice will also be wet. Hence, the jet will actually be at the temperature of wet steam at atmospheric pressure, which is 212 degrees Fahr. A thermometer inserted into the jet will indicate a temperature which is considerably higher than 212 degrees Fahr.

A gas discharged from an orifice has a very low temperature resulting from adiabatic expansion. This temperature is only relative to a thermometer moving with the velocity of

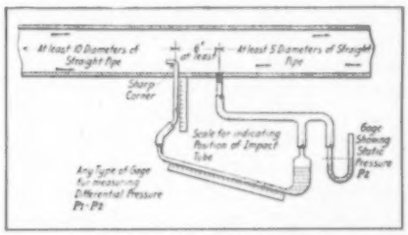

At least 10 Diameters of Straight Pipe
6" or More
At least 5 Diameters of Straight Pipe
Sharp Corner
Scale for indicating Position of Impact Tube
Gage Showing Static Pressure P2
Any Type of Gage for measuring Differential Pressure P1-P2

FIG. 8—IMPACT TUBE AND HOLE IN PIPE WALL FOR MEASURING PIPE FLOW

the jet. The individual molecules have the same average kinetic energy and the same temperature as they originally had.

Temperature measurements have been made which show temperatures in a high velocity jet of air much above the theoretical adiabatic temperature of the jet. It was alleged these experiments showed that the velocity of such a jet was not the theoretical velocity due to adiabatic expansion, and that it was not possible to expand a gas in a nozzle so as to obtain such a velocity. This conclusion is incorrect and with a properly-shaped orifice or nozzle nearly the theoretical velocity due to adiabatic expansion can be obtained with air or any gas, just as with steam in a steam turbine. If the energy is extracted from the jet by means of a turbine wheel or the like, the exhaust steam will show low temperature. Nearly initial temperature will be shown if the thermometer is inserted directly in the high-velocity jet.

The temperature of the walls at the orifice end of the pipe in which a high-velocity jet is flowing, is another interesting matter. There is reason to believe, if the tube is perfectly smooth from a molecular point of view, that the temperature of the wall will be the theoretical adiabatic temperature. A temperature intermediate between the initial and the adiabatic temperature will be read if the wall is rough.

A similar situation arises when a thermometer is inserted in the jet. This thermometer will probably read initial temperature provided the perfectly square end is exposed to the jet. If the thermometer has a rounded end and some side walls exposed to the steam, a lower value will be read. If the tip of the thermometer be shielded so that only the thermometer walls, parallel to the jet, are exposed, a value nearer the adiabatic temperature will be read. Intermediate arrangements will give temperatures between the adiabatic and initial values.

The temperature shown by a thermometer which had only a square end exposed to the jet would probably be initial temperature rather than the temperature which would result from destruction of the initial velocity at the lower pressure. This latter temperature is that obtained in a porous-plug experiment or any other case of expansion with constant total heat, and is cooler than the initial temperature. Experimental measurements of this have baffled physicists for years. Possibly such experiments may be made by using a thermocouple in a high-velocity jet, one side exposed to the impact temperature, and the other shielded from the impact temperature and exposed only to gas whose velocity has been destroyed.

Velocity an Important Factor

Experiments on temperature of air after great expansion show thermometers directly in high-velocity jet have a lower temperature than those a little further away where the velocity had been destroyed. This is due to the fact that the orifice which was demanded by the pressure ratios involved should have been first converging and then diverging. The actual orifice was a straight passage succeeded by a sudden enlargement to a chamber where the thermometer was inserted. This formed an orifice mouth with area greater than necessary and gave expansion to a pressure lower than atmosphere. The adiabatic temperature with such an excessive expansion would be lower than with expansion to atmospheric pressure. It could easily be lower than the temperature of the jet after it had gone up to atmospheric pres-

sure and had had its velocity destroyed.

The exact shape of the impact tube is not important. It is necessary that there be a pipe or tube facing squarely up stream in a jet undisturbed except by the impact-tube end. The impact-tube end before it bends away from the jet should have a straight portion parallel to the jet about 10 times the length of the impact-tube opening. The open end of the tube should be slightly rounded on both inner and outer edges and should be smooth For ordinary work, the tube is ¼ inch to 1 inch in diameter. For work with small pipes, and for special exploration work, the tube may be of any size. The writer has obtained satisfactory results with tubes as small as 1/32-inch outside diameter.

The impact tube must face squarely downstream. There is no necessity for exact measurement in this connection, and estimation by eye is accurate enough. Readings in a constant jet with impact tube rotated, show that angles of several degrees on either side of the exact downstream position, give no effect on the readings. As the tube is rotated further, the readings fall off rapidly. While the tube is facing up stream at an angle and before it becomes perpendicular to the stream, the differential pressure becomes zero and the impact tube reads the static pressure. When the tube is perpendicular to the stream the differential reading becomes negative. If the outer end of the tube is bent in the same plane as the inner end, as shown in Fig. 8, the tube inside the pipe will face downstream properly.

Location of Static Holes

Figs. 4, 5, 6 and 7 show different methods for obtaining static pressure. Fig. 4 shows how actual pressure is obtained by means of a hole in the pipe wall. The inner surface of the pipe, adjacent to the hole, must be smooth. The hole must be at right angles to the surface and there must be no burrs. The inner corners should be rounded with a radius 1/10 to 1/50 of the diameter of the hole. Fig. 2 shows a number of static holes. This form is in common use and any variation in static pressure is averaged. It is questionable whether any advantage is obtained from the multiplication of holes. Possibly the pressure reading is the average reading of the two holes on either side of the connection to the gage. This is because any difference in the static pressure will create a flow in the outer ring with different pressure at various places. There will not be a constant pressure at all points of the chamber at the average of the different static pressures. When there is a proper length of straight pipe preceding the point of measurement, such arrangement as Fig. 5 is not necessary. When there is not a proper length it is questionable whether the arrangement of Fig. 5 will give good readings.

Static holes such as Fig. 4 are often made with burrs on the inner surface or with the pipe leading to the measuring instrument projecting into the stream. These practices cause serious errors and must be avoided. If it is not possible when work is done in the field to make proper holes of the type shown in Fig. 4, the arrangement of Figs. 6 or 7 must be used.

The pressure holes for any of these types must be of good size. They should be at least ¼ inch to 1 inch in diameter in order to avoid a drop of pressure which might occur with a small hole and a minute leak. One of the disadvantages of the common

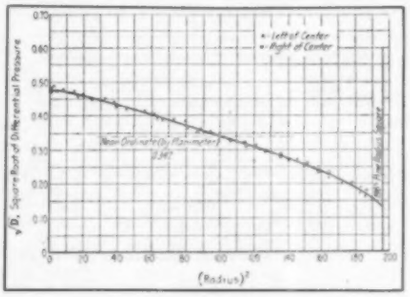


FIG. 9—CURVE OF PIPE-FLOW TEST
The Mean Ordinate of a Smooth Curve Through the Points, as Found By a Planimeter, Gives the Square Root of the Impact Pressure Difference *D*, which is to be Inserted in the Formulas

form of pilot tube is that the static holes are often so minute that the pipes to the pressure-measuring instrument must be of extraordinary tightness to secure accuracy. If a large hole is used in the pipe wall, or the equivalent, as in Figs. 4, 5, 6 and 7, and if the impact tube is made of good size with the opening ¼ to 1 inch in diameter, a slight leak will not have very serious effect. Nevertheless, precautions should be taken to keep the pressure piping tight.

It is desirable to use large pipes for connecting the static and impact tubes with the measuring instrument. Standard ¼ or ⅛-inch piping should never be used for such purposes unless the connecting lines are very short. When the piping is of any great length, ½-inch or even 1-inch pipe should be used, because it is much easier to make the larger-size pipe tight, and because even a small leak will not cause much of a pressure drop. The differential pressure measured is usually quite small; a slight error in either pressure will cause an appreciable error in the differential.

The following methods of test for tightness of piping apply to pilot and impact tubes, flow-meter work, venturi-meter work, etc.:

1.—A leak will always be shown by a drop in pressure if the connecting pipe is filled with water. Such leaks tend to rust tight, so the drop will soon disappear.

2.—While the pipe is filled with gas under pressure, the entire outer surface, including all fittings and joints, must be painted. If there is steam or hot gas in the pipe, this coating should consist of cylinder oil. If there is air or cold gas in the pipe, it should consist of a thick lather of soap suds. Every part of the surface must be thickly coated. Leaks will be shown by bubbles.

3.—If there is a sensitive differential gage attached to piping of considerable length, valves should be inserted on both the static and impact sides immediately adjacent to the pipe in which the flow is to be measured. A by-pass valve connecting the two pressure pipes should also be installed immediately adjacent to the measuring instrument. Such valves can be used for testing leakage as follows: The by-pass valve should be opened and the valves on the pressure pipes closed as rapidly as possible in the following order: First, approximately close the valve on the pipe giving the lowest pressure, then the valve giving the highest pressure. Now completely close the valve giving the lowest pressure, and then the valve giving the highest pressue. Lastly, close the by-pass valve. Fluid under pressure will be trapped in each of the pressure pipes. The measuring instrument will indicate a definite pressure difference which will remain unchanged if there is no leak on either side. The instrument will remain unchanged if there are equal leaks in the two sides, but this condition is almost inconceivable. If the instrument varies, even though the pipe be tight, the valves may leak. Under such conditions the test gives no information.

Measuring Pipe Flow

The apparatus for measuring pipe flow should be arranged as shown in Fig. 8. Instead of the single static hole, as shown, other means of securing static pressure can be used, such as shown in Figs. 5, 6 or 7. When methods of Figs. 6 or 7 are used, the impact tube must be placed at such a distance that it will not disturb the flow recorded by the static tube.

If the test gives flows which show a differential pressure of 1 inch (water column) or more, it is best to connect a vertical water U-tube parallel to a differential gage. A steel scale with graduations on both sides should then be provided. These graduations on one side should be 1/64, 1/50 or 1/100 of an inch. The two legs of the U-tube should be separated accurately. The two legs of the glass must be of exactly the same diameter.

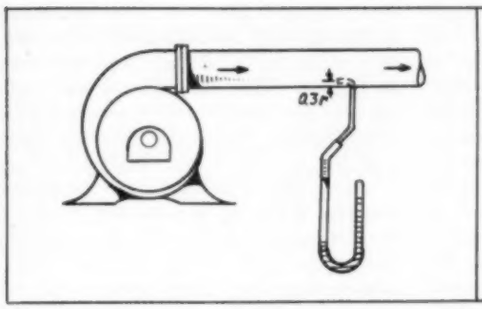


FIG. 10—IMPACT TUBE GIVING TOTAL PRESSURE RISE WITH ATMOSPHERIC INLET PRESSURE

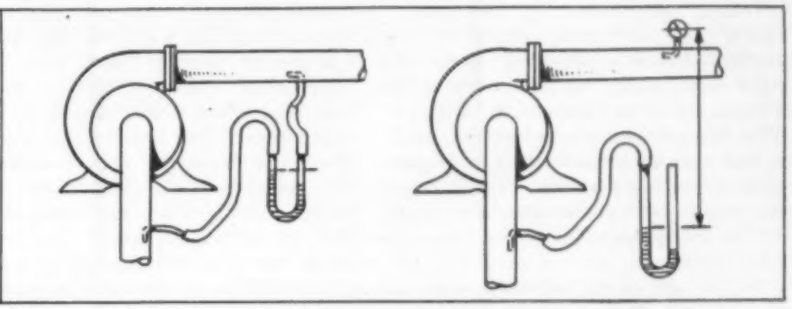


FIG. 11—IMPACT TUBES GIVING TOTAL PRESSURE DIFFERENCE BETWEEN INLET AND DISCHARGE PIPES

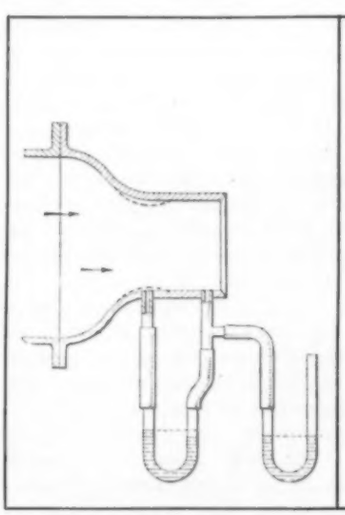
Satisfactory readings can be obtained by using a magnifying glass and a good light. If a number of readings are made with a differential pressure of 1 inch of water, the average of the ratios of such readings to the readings of the differential gage gives a satisfactory constant for calibration or checking of the differential gage.

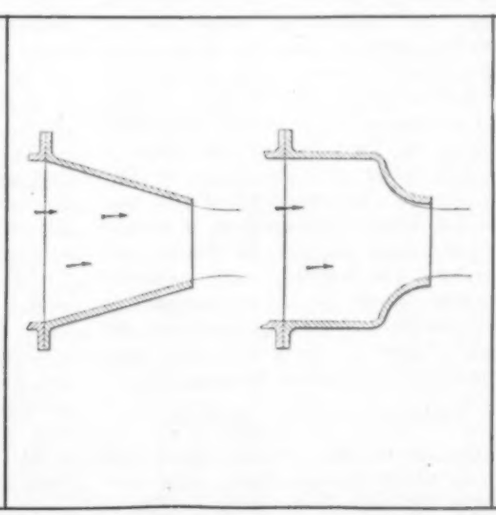
Readings should be taken with the impact tube placed at points in various concentric circles within the pipe. One method is to space the positions at distances proportional to the square of the radius. The arithmetic mean gives a number properly weighted for the various areas involved.

The writer has found it satisfactory to measure the actual radius with each setting, spaced more closely at the edges than at the center. The various readings are then plotted, as shown in Fig. 9, readings on both sides of the center being plotted together. The square of the radius is plotted against the square root of the differential pressure. The mean ordinate of such a curve gives the mean square root of the differential, properly averaged. The static pressure is measured independently. The computation work is simpler if this is taken rather than impact pressure.

When a fluid is flowing in a pipe, it is frequently desirable to use the impact pressure rather than the static pressure. An example of this is pressure in a pipe preceding a venturi meter or other form of orifice in a pipe line. This pressure as well as the pressure at the throat or orifice end involves the ordinary formulas and includes a troublesome corrective term for the initial velocity at the point where the initial static pressure is measured. If this initial pressure is measured with an impact tube, the velocity head at this point is automatically added to the static pressure. The net pressure obtained is equal to the pressure which would have been obtained if the pipe preceding the orifice had been large enough to render the velocity head negligible. The formulas for this case are very much simpler than those in which the initial velocity has to be taken into account. If there is any foreign matter in the stream, it is likely to clog the impact tube. In such a case, initial pressure must be measured by means of a hole in the pipe wall and the ordinary formulas which take account of initial velocity must be used.

Another case in which it is convenient to measure the impact pressure is in finding the total pressure rise produced by a centrifugal pump or centrifugal compressor. If the discharge pipe of such a machine is very large, the velocity head in it is negligible, and pressure produced is static. If the pipe is small and gives an appreciable velocity head, as is often the case with fan blowers and centrifugal compressors producing a pressure of 2 or 3 pounds per square inch, the energy actually put into the air by the machine is completely shown by the impact pressure. It is correct to compute the efficiency of the machine on the basis of impact pressure. The arrangement is shown in Fig. 10. A similar arrangement can be used in the case of centrifugal pumps. If the inlet and discharge pipes are of the same size, impact tubes give the same difference as static holes. Should the inlet pipe be larger than the discharge pipe, impact tubes in both pipes automatically take account of the difference in velocity heads. The difference in the pipe





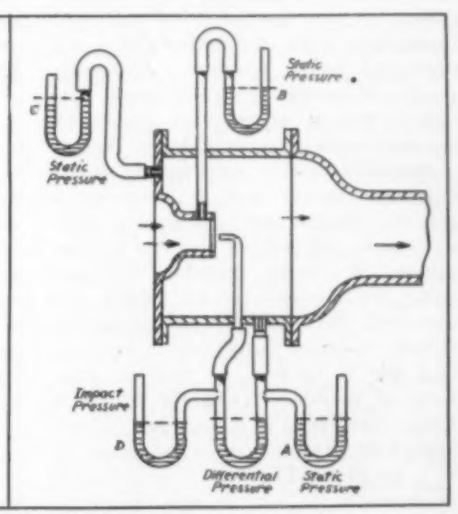


FIG. 12—APPARATUS SHOWING CONTRACTION AT END OF CONVERGING PORTION OF AN ORIFICE FIG. 13—POORLY SHAPED ORIFICES CAUSING JET CONTRACTION AND EFFECTING JET DIAMETER LESS THAN ORIFICE END DIAMETER FIG. 14—ORIFICE DISCHARGING INTO AN ENCLOSED REGION

The static pressure of regions, such as *A*, *B* and *C* in Fig. 14, in which several jet discharges must be taken are shown to be exactly the same. If the orifice is supplied directly from the atmosphere, the impact pressure *D* will be zero

pressure, as shown by the impact tubes, plus the head equal to the vertical height difference, gives the total work done by the pump. The arrangement is shown in Fig. 11. The foregoing remarks do not apply to the case of pulsating flows, as with a reciprocating machine. In all cases, the impact-tube center should be about 0.3 of the pipe radius from the pipe wall.

As an additional advantage in the use of the impact rather than the static pressure, it should be noted that the pressure is obtained more accurately. The tapping of a pressure hole in the pipe wall is very uncertain and it is often easier, particularly in the case of field tests, to insert an impact tube than it is to take the necessary precautions to make sure that a hole in the pipe wall is free from burrs and projection.

convergent portion, of sufficient length to size the jet. At the end of the convergent portion there may be a contraction of the jet, due to the fact that the orifice is not shaped to avoid contraction. The existence of such an effect can never be known except by an actual experiment. The figure illustrated in Fig. 12, represents a case where a comparison was actually made between pressure in a parallel portion of the orifice with atmospheric pressure on one side, and with pressure at the end of the convergent portion on the other. It was found that pressure in the parallel portion was equal to atmospheric pressure, while pressure at the end of the convergent portion was below atmosphere. The contraction in the jet is shown in Fig. 12. In other words, there was a venturi-meter effect, and the jet at this point did not quite

and round. This is quite important.

The general arrangement of a venturi meter with impact tube is shown in Fig. 16. The use of an impact tube avoids the computation necessary in determining the initial velocity head and the necessity for care in drilling a static hole. From the discussion already given it is obvious that the impact tube, theoretically, could be placed in the throat of the meter adjacent to the static tube. In the case of a large meter where the impact tube can be made so small that it will not affect the area nor the readings of the static tube, this arrangement is perfectly practical. However, in many cases an impact tube of reasonble size would disturb the jet at the throat.

Fig. 16 also shows some additional readings which have been found convenient in the case of venturi meters

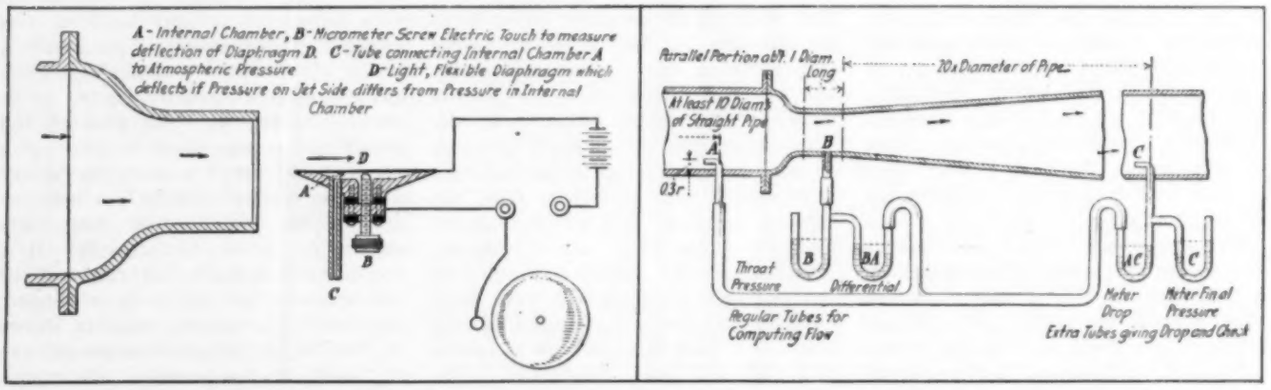

A - Internal Chamber, B - Micrometer Screw Electric Touch to measure deflection of Diaphragm D. C - Tube connecting Internal Chamber A to Atmospheric Pressure D - Light, Flexible Diaphragm which deflects if Pressure on Jet Side differs from Pressure in Internal Chamber
D
A
B
C
Parallel Portion abt. 1 Diam Long
10 x Diameter of Pipe
At least 10 Diams of Straight Pipe
A
B
C
03r
Throat Pressure
B
BA
Differential
AC
C
Meter Drop
Meter Final Pressure
Regular Tubes for Computing Flow
Extra Tubes giving Drop and Check

FIG. 15—APPARATUS TO SHOW EQUALITY OF STATIC PRESSURE IN JET AND ATMOSPHERE FIG. 16—VENTURI METER WITH IMPACT TUBE AND EXTRA TUBES FOR EXPERIMENTAL PURPOSES

In Fig. 15: *A*, Internal Chamber; *B*, Micrometer Screw Electric Touch to Measure Deflection of Diaphram *D*; *C*, Tube Connecting Internal Chamber *A* to Atmospheric Pressure; *D*, Light, Flexible Diaphram which Deflects if Pressure on Jet Side Differs from Pressure in Internal Chamber

The "orifice" frequently discussed in this article is a smoothly formed, convergent passage. Such an orifice is used at the entrance of a venturi meter, or for measurement of fluid discharged into the atmosphere, as discussed later. The exact shape by means of which the convergent portion is secured is not very important. A cone with straight sides, however, is probably equally satisfactory, if the angle is gentle and if there is a smooth circular arc connecting with a straight portion at the end of the orifice. It seems probable that any shape will be satisfactory which will obviously have a gentle action on the stream, without interference and eddies due to corners or sudden variations of section. When the orifice is being machined, it is not particularly important that the shape be made to fit a templet. The orifice wall should be smooth, as any lumps or ridges will cause irregularities in the fluid flow.

It is essential to have a parallel section of pipe at the end of the

fill the orifice. Hence, if the orifice had ended at the end of the convergent portion giving an orifice of the shape of Fig. 13, the jet escaping into the atmosphere would be of smaller diameter than the orifice end. The quantity would have appeared to be larger than it actually was. A similar situation is given by the other orifice of Fig. 13. If we have a venturi meter with the shape of Fig. 16, the parallel portion insures that the jet whose measurement is sought has the exact diameter of this parallel portion. The length of such a parallel portion should be from one-half to the whole of the diameter of the parallel portion. Greater length might introduce appreciable friction drop.

Chamfering is of Importance

The chamfering of the outer end of an orifice is important. This prevents the edge from being burred or dented while handling and preserves the diameter of the parallel portion. The parallel portion must be carefully machined so as to be exactly parallel

used for experimental testing. For permanently installed venturi meters, these extras are of no particular advantage. The extra apparatus consists of an impact tube, *C*, in the pipe beyond the meter, and shows the pressure drop resulting from the use of the meter. It is quite necessary that the tube, *C*, be placed at a considerable distance from the meter in order that the jet may have wholly recovered from the divergence due to the meter. The streams, and the static pressure particularly, are not normal at points near the end of the divergent part of the meter. The impact tube, *C*, is connected so as to show the final pressure directly, and also, the difference between this pressure and the initial impact pressure. This gives the meter drop or pressure difference caused by the insertion of the meter. The meter drop, *AC*, is usually from ¼ to ⅛ of the meter differential pressure, *BA*. The system shown involves four U-tubes, one of which is superfluous. However, the use of this extra U-tube gives a very valuable means for checking the readings. The

readings will check as follows, if all pipes are tight and the apparatus properly set up:

If B and C are above atmosphere, the difference between B and AC will equal the difference between C and BA.

If B is below atmosphere and C above, the sum of B and AC will equal the difference between C and BA.

If B and C are below atmosphere, the sum of B and AC will equal the sum of C and BA.

The writer's custom has been to have the readings inserted in this equation as soon as they have been taken. If the equation is not satisfied there is a leak, or something else is out of order in the apparatus.

The only case where the pressure of a jet discharging from an orifice into the atmosphere is discussed in this paper is that in which the final pressure is greater than half the initial pressure. However, the theoretical orifice was wholly convergent. In such a case, the static pressure of the jet discharged from an orifice is equal to the pressure of the region into which it discharges. This law applies primarily to the discharge of an orifice into the atmosphere. It also applies to discharge of an orifice into an enclosed region, as is shown in Fig. 14, provided there is ample room around the orifice for a free discharge of jet and no restriction that would cause a venturi-meter effect. The static pressure of the region into which a jet discharges must be measured in a number of places, such as A, B and C, Fig. 14. If the orifice is supplied directly from the atmosphere, the impact pressure, D, will be zero. The accuracy of the above law is really the basis of all of the impact-tube work here discussed. So far as known, the law has never received any valid criticism. In one case a certain form of pitot tube, when inserted in a jet discharging into the atmosphere, gave readings below atmosphere at the static openings, and it was assumed that the static pressure of the jet was, therefore, below atmosphere. This particular form of pitot tube is now know to have static openings seriously in error. As an actual fact, readings of static pressure below atmosphere, when taken with a pitot tube inserted in a jet discharging into the atmosphere, are proof that the static-pressure holes give erroneous readings.

If the orifice at the end has a parallel portion of appreciable length, the streams of the jet as they discharge into the atmosphere necessarily proceed in straight lines. This can be seen by watching the jet discharging from a water or wet-steam orifice of the proper shape, or by feeling the surface of an air jet. The jet preserves a solid parallel column for quite a distance. If a stream at the edge of the jet and one in the interior of the jet are proceeding in parallel directions, there can be no pressure difference between them. If there were any pressure difference, the flow would be in curved lines. A stream at the edge of the jet, proceeding in a straight line, is obviously at the pressure of the region. Hence, the same pressure exists throughout the cross-section of the jet.

The experiment of Fig. 15 verifies the foregoing statements. A diaphragm pressure gage was placed in a high-velocity jet with the diaphragm exactly parallel to the stream lines. This was accomplished by clamping the gage in a position perpendicular to the plane of the end of the orifice, as shown by an accurate square. The gage comprised a small chamber, one edge of which consisted of a very light, flexible diaphragm. A tube leading well outside the jet made the pressure in this chamber equal to the pressure of the atmosphere. A delicate micrometer screw, with an electric bell and battery attached, indicated the deflection of the diaphragm. When the jet was not flowing, the micrometer was screwed out until the bell just stopped ringing. The jet was then turned on. Adjustment of the micrometer screw showed position of the diaphragm unchanged. This experiment was made with a velocity of about 150 feet per second, and the deflection of the diaphragm was seen to be zero within a few hundred thosandths of an inch. The diaphragm was such that it would be deflected about 0.001 inch by a pressure of 0.005 inch of water. A similar result can be obtained if the side gage shown in Fig. 7 be set up in a jet, parallel to the stream lines and connected to a delicate pressure measuring instrument.

The static pressure of the jet being thus the pressure of the region into which it discharges it follows that the differential between impact and static for a jet discharging into the atmosphere is given by a gage which reads pressure above atmosphere.

Many calibrations of orifices discharging high-velocity jets of air have been made by the writer with the appa-

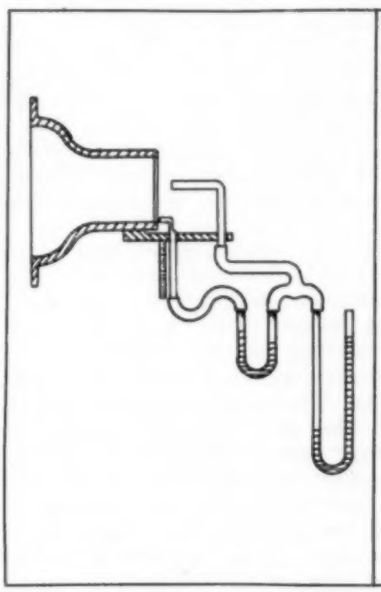


FIG. 17 — ORIFICE CALIBRATION BY TRAVERSE OF AN EXPLORING IMPACT TUBE

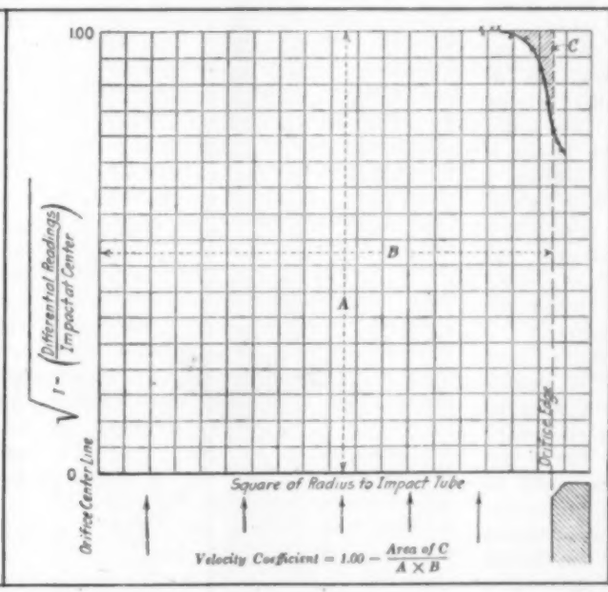


FIG. 18—CURVE OF ORIFICE CALIBRATION BY IMPACT-TUBE TRAVERSE

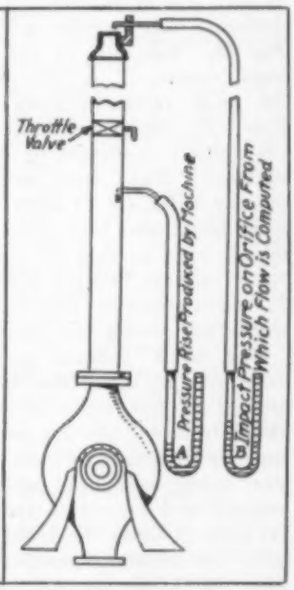


FIG. 19—MEASUREMENT OF FLOW BY MEANS OF ORIFICE AND IMPACT TUBE

ratus shown in Fig. 17. This consists of a stationary impact tube placed in the center of the jet, slightly beyond the plane of the orifice end, and a very small movable impact tube which can traverse the edge of the jet covering a space of ¼ to ½ inch. The differential pressure is read by means of a vertical water U-tube, or a more delicate instrument, as circumstances warrant. The method gives an accurate calibration of any orifice without measuring the flow by means of tanks, wiers, gas-holders, etc. The impact pressure is constant everywhere in the jet, except in a narrow ring around the edge which is traversed by the small impact tube. An impact tube with an outside diameter of 1/32-inch has been used with a 4-inch orifice, traversing a space of about ¼ inch and proportionately with larger orifices. The results are plotted in Fig. 18. The ratio of the area of the small corner, *C*, to the area, *AB*, of the large rectangle, gives the velocity loss. By subtracting this from unity, the velocity coefficient of the orifice is obtained. Many such tests indicate a velocity coefficient of about 0.99. These experiments have been accurate to within 0.5 per cent, so that the coefficient may be somewhere between 0.985 and 0.995. It seems probable that the larger the orifice the greater the coefficient.

The same general methods have been used by the writer to find velocities of various types of jets, such as those from the nozzles and stationary buckets of steam turbines. Small impact tubes were used which could be rotated and moved in two directions. At each position the tube was rotated until the maximum reading was found, and the angle noted. In this way, the stream lines were completely mapped out, both as to velocity and direction. In all cases the work was done with jets discharging in straight lines into a large chamber which had a definite and uniform static pressure. Static pressure variation and curvilinear motion cannot be investigated easily in this way. The static pressure was found in a dead corner where the jets could not give error. The velocity was computed from the theoretical laws for adiabatic flow and the impact-tube law already given. The jets from a stationary set of turbine buckets were concentrated near the active faces. The faces were clevised. A jet from a moving turbine wheel would be pulsating, and could not be explored by this method.

Measurement of High-Pressure Air

The general arrangement for measuring the discharge of high-pressure air by means of an orifice and impact tube is shown in Fig. 19. The discharge pipe of the machine is connected with a considerable length of straight pipe. The orifice is attached to the end of this pipe. It is desirable to have a throttle valve in the pipe so that various amounts of flow, giving various loads on the machine, can be measured by means of a single orifice. It is necessary that there be at least 10 diameters of straight pipe between the throttle valve and the

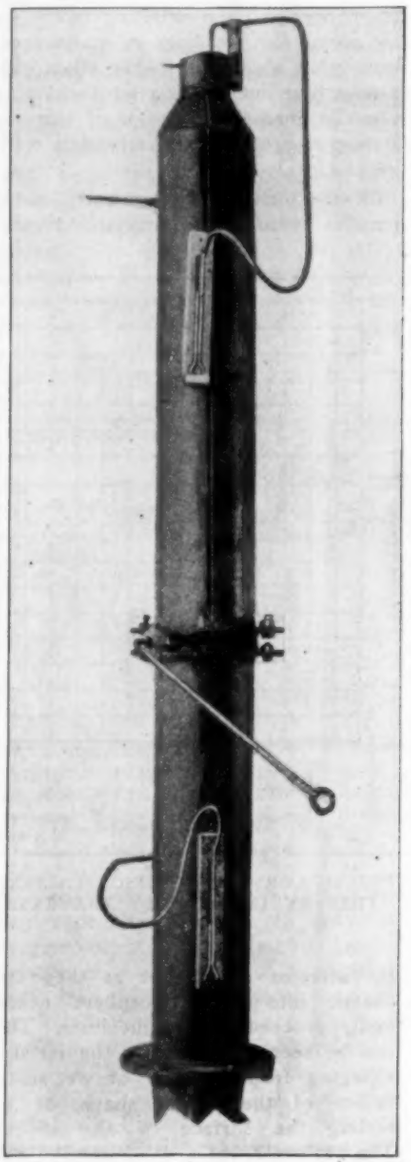


FIG. 20—ORIFICE, IMPACT TUBE AND DISCHARGE PRESSURE ARRANGEMENT

orifice. If it is desired to measure the discharge pressure produced by the machine, it is necessary, in addition, to have about 10 diameters of straight pipe between the machine itself and the throttle valve. An impact tube inserted in this pipe gives the net pressure rise which the machine under test produces; while the impact tube on the orifice gives the quantity passing through. The orifice should be selected so that it will just discharge the greatest quantity which the machine will produce with an orifice-impact pressure equal to the total pressure produced by the machine when this quantity is flowing. Then the highest flow of the test will be obtained with the throttle valve wide open. For this flow, the readings of the impact tube in the pipe preceding the throttle valve, and that in the orifice jet, should be identical, except for slight friction loss in the pipe. This identity gives a check on the validity of the readings and apparatus. Various tests with successively lower amounts of flow are given by closing the throttle valve so as to decrease the orifice pressure.

The impact tube is to be stationary and in the center of the jet. The tube is placed slightly outside the plane of the orifice end. This distance should be about 1/5 of the orifice end diameter. The tube can always be seen to be properly in line and free from obstructions. This is one of the advantages of the method. The general method here described has been used for testing centrifugal pumps. It is just as convenient to use it in conjunction with high-velocity jets of air or other gases.

The parallel portion at the end of the orifice should have a diameter about 1/3 of the diameter of the straight pipe preceding the orifice. The orifice may be smaller than 1/3 of the pipe diameter without any effect. The coefficient does not differ greatly from 0.99, even if the orifice is but 1/2 of the pipe diameter. In all such cases, the effect of the varying velocity at different radii in the pipe is not transmitted through the orifice; but the discharge jet has the same velocity at all points, except at a narrow band close to the edge. Where the orifice diameter is greater than 1/2 the pipe diameter, the variation of pipe velocity may show some effect on the discharge jet.

Limitation of the Impact Tube

The impact tube, as here discussed, can only be used with continuous flow, such as is given by centrifugal machinery. Pulsating flow, as delivered by reciprocating machinery, cannot be integrated by the impact tube.

In order to compute the quantity or flow, it is necessary to know the temperature in the pipe preceding the jet. This must be secured by the insertion of a thermometer through the pipe wall. However, identical and accurate readings are obtained by placing the bare bulb of the thermometer in the jet outside the orifice.

If a machine whose flow is to be measured can be arranged so that its discharge can be wasted, the use of an orifice in the discharge pipe is the

only method of flow measurement which should be considered. The reason is that nearly the entire pressure rise produced by the machine can be utilized in causing discharge through the orifice. This gives a reading of such magnitude that accurate observations can be made. For instance, if the machine being tested gives an air pressure of 15 pounds per square inch, the reading from which the flow is computed will be about 30 inches of mercury. If the machine gives an air pressure of about 1 pound per square inch, the reading will be 27 inches of water. Such magnitudes are easily measured and do not require the use of inclined gages, hook gages, or other means of getting small differentials.

The use of the impact tube has the advantage of simplicity of formula in connection with initial velocity head as well as ease of proper arrangement, over the use of a static hole in the pipe-wall preceding the orifice. Many million cubic feet of air discharged by various types and sizes of fan blowers and centrifugal air compressors have been measured by the arrangement of the impact tube shown in Fig. 20. This tube is made in two sections.

Broader Service For Engineers

BY D. S. KIMBALL

WE HAVE all become accustomed to seeing the engineer called upon to perform new and strange duties, but few of us were prepared to see an engineer called upon to undertake the greatest piece of constructive economics ever attempted. I refer to the work of Mr. Hoover, who by training and practical experience is a mining engineer. Yet this somewhat startling event is in full keeping with the trend of modern industry. The engineer from the first has had a difficult time trying to define just what his field of activity is. This is necessarily so in any civilized community where the life of the people rests upon mechanical contrivances. Engineering, and mechanical engineering in particular, is an integral part of everyday life and necessarily assumes fresh aspects as the complexity of modern life increases.

Technical Schools Alter Scope

The original conception of technical schools was to train men to design, build and operate machines within a narrowly defined field. The closely prescribed curriculum of the early engineering schools succeeded well in sending out men who in time made a place for themselves in the engineering field. But the men who passed through these schools were far from satisfied with the training they thus received. Their complaint has not concerned the technical studies alone, but has embodied a demand for broader training in harmony with changing industrial conditions. Today there is not a first-class technical school in this country that is not recognizing this demand. The technical schools of today are not places where engineers, as defined by this term originally, are educated, but they are schools that prepare men, and women also, for industrial life in a broad manner.

It may be truthfully stated that the engineer has been drawn over into management more because of his peculiar method of attacking problems than because of his technical or commercial knowledge; and that for this reason engineering colleges may well neglect these broader subjects and confine themselves to the time-honored engineering studies. While this may all be true theoretically, the fact remains that the industrial field is demanding men from the engineering schools who are well grounded in engineering and, in addition, know something of management. Hence we find such subjects as economics, psychology, logic, public speaking and similar studies included in engineering curricula, and they appear no more strange there than does an engineer as a food administrator.

What is true of the engineering schools is equally true of the engineering societies. The engineering colleges have lagged behind the industrial field in these matters, and the engineering societies in turn have lagged behind the colleges. In 1880, Dr. Robert H. Thurston, the first president of the American Society of Mechanical Engineers, in his inaugural address states the objects of the society to be "the promotion of the arts and sciences connected with engineering and mechanical construction". And the chairman of the preliminary meeting, A. L. Holley, enumerates in some detail the several branches of engineering contemplated as follows: Metallurgy, railway engineering, machine-shop work, rolling mills, structural work, national defenses, shipbuilding, agricultural machinery and textile machinery, and concerning the latter he states, "The public would deem it quite outside of mechanical engineering". It is on this analysis as a basis that the first list of those eligible to election was made up, namely, mechanical engineers, civil engineers, military engineers, mining and metallurgical engineers and architects. And after reviewing the field, which to us now seems so restricted, Mr. Holley remarks, "I confess that in thinking over the range of mechanical engineering with reference to our proposed society I was astonished at its magnitude."

Dr. Thurston stated a broader view later when he said, "Its province will lie no less in the field of social economy than in that which has reference only to the individual needs of its members." This germ of thought has always remained in the A. S. M. E. and found its most widely known expression in Frederick W. Taylor's classic paper on shop management. But though this remarkable paper was presented to the world through the society, comparatively little has been done by the society to further this important line of thought.

Society Membership Changes

Ten years ago Prof. F. R. Hutton in his presidential address made an exhaustive review of the aims and activities of the American Society of Mechanical Engineers which is well worth reading. He found that about 50 per cent of the membership at that time was classifiable under the headings "manufacturer", "shop executive" and "local manager". Yet the transactions for that year do not contain a single paper on industrial administration, though Taylor's masterpiece had been published three years before. An examination of any page of the year book will show that this relation has not changes and that the society is far from being, strictly speaking, an engineering society, but that it represents industry in a very comprehensive and broad manner.

What is true of the relation of mechanical engineering to management is also true of many other fields. Is the problem of electric welding one for the mechanical engineer, or does it belong to the field of electrical engineering? Where shall we place oxyacetylene welding on the thermit process? Accident prevention is certainly within the range of the society's

activity, so far as the mechanical features are concerned, but how far shall we interest ourselves in our employers' compensation acts and the legislation that lies back of this important movement? Shall we discuss it as a problem in mechanical engineering or shall we also include the humane features of the problem? At the present moment a strong movement is on foot to interest engineers in the important problem of Americanization, and engineering schools are being urged to pay special attention to this matter. The subject is timely and important, and no single class of men can do so much to promote it as the engineers. The problem is closely connected with industrial management; shall it become, therefore, a problem for engineers and engineering societies?

These intricate relations come before the society largely in passing upon papers to be presented. Many of the papers offered are well within the range of the field of engineering as commonly understood, a number are in the field of industrial management or in other fields equally removed from engineering in a strict sense. Then there are a number of papers presented that are so far removed from engineering as to make their presentation questionable, though they are sometimes valuable papers. The tendency, therefore, is rather to discourage papers which treat of matters on the "fringe" of engineering. I sometimes wonder if Taylor's paper on shop management, had it been presented by some one less known and under some other title, would have been accepted. It is fairly certain that if more encouragement were given to papers of this broader character societies probably would, in time, receive papers that would be as great in their field as is Taylor's classic.

I believe the time has come, therefore, when every engineering society should redefine its aims and objects. There will never be a better or more opportune time to consider this subject. Every loyal American is now asking himself what are his duties and responsibilities. Every technical school is facing a reorientation of its purposes and aims. As a nation we are facing a period of self-analysis that may result in changing some of our fundamental policies. I am not so sure, for instance, that we shall continue to be a "refuge for the oppressed of the earth", unless we are quite sure that the aforesaid oppressed are really in pursuit of the liberty and happiness that we all hold so dear. Americanization may indeed be a part of the work of all organized bodies that are interested in the existence of the republic. If we have not at this moment a clear vision of whither we are tending, now is the time of all times to take stock of ourselves and to redirect our course, whether this course is in conformity with time-honored definitions or not. Change is not necessary synonymous with progress, but there is no progress without change.

Wanted---Standardized Mill Motors

BY W. T. SNYDER

IN THE early days of electricity in the iron and steel industries, some of the builders of traveling cranes made the motors for their cranes or had them made to order. This practice is now obsolete by virtue of the growth of specialization. Motors are made by the motor manufacturers; cranes are built by crane builders, as each is an apparatus requiring an individual type of organization and manufacturing equipment.

Crane users in the steel industries select the motors that are to be used on their cranes, and as far as they are able they standardize on one type for the sake of interchangeability and to minimize spare parts. By reason of the fact that there is no uniformity in motors of like operating characteristics made by different manufacturers, it is impossible to interchange different makes. The result is that the initial installation governs the later motors purchased.

Based on the factor 0.0064 horsepower of motor energy required per ton of iron produced, and also on data from plants handling iron from the ore through the mills, there were approximately 800,000 motors in use in 1917. Data from the United States bureau of census indicate that there are nearly 1,000,000 motors in the steel and allied industries. These 1,000,000 motors under a liberal estimate will probably be charged off in 20 years. This time limit is not too low when it is considered that a large portion of direct-current motors now installed could be alternating current. Alternating current is replacing direct-current equipment because of the higher economy of alternating current power generation and transmission.

Cost of Spares is High

With 1,000,000 motors installed, a conservative estimate indicates 500,000 armature changes per year, with 200,000 spares representing an investment of $80,000,000. If these same motors were of standard type, with a maximum of interchangeable parts, the armature changes would be the same, but the spares would be reduced to about 50,000 and would necessitate an investment of only about $20,000,000.

The steel plants at the present time have only two alternatives. They may adopt a certain make of motor and enjoy the benefits of standardization as far as they are able under the existing conditions of many types and models; or they may buy motors in open competition and content themselves with a conglomeration of types with a maximum of confusion and an excessive investment in spares. If within five years from now we could begin to install motors that adhere to standards covering perhaps only speeds and the more general dimensions, we would start to right this condition. The benefits would increase with the development along the standard lines.

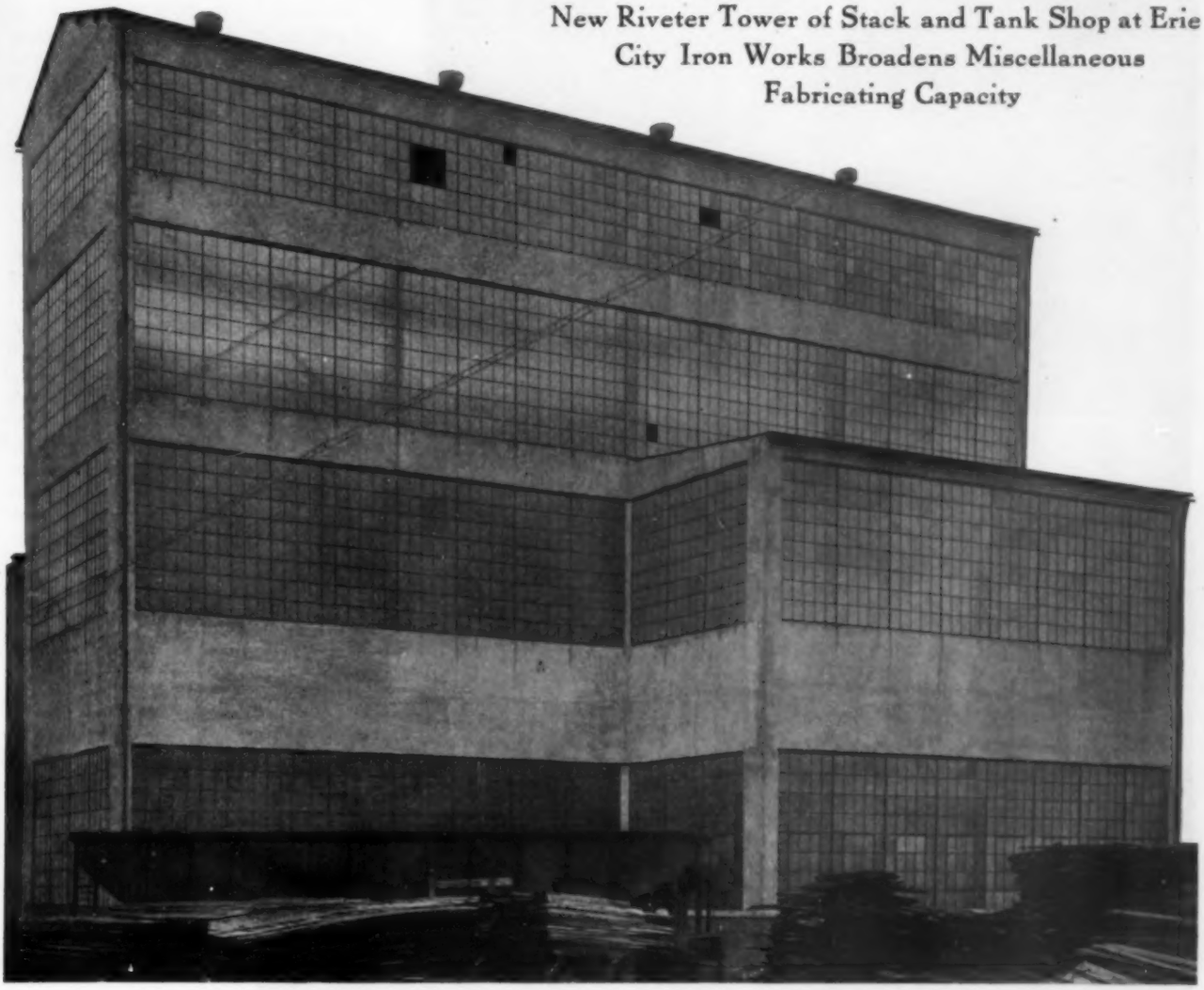
The Association of Iron and Steel Electrical Engineers through its standardization committee has endeavored to formulate plans that will ultimately provide a standardized motor for machine tools and mill auxiliaries. It is a task that cannot be accomplished hurriedly. The committee is studying the possibility of a joint committee of engineers representing makers and users to design a line of standard motors which all manufacturers will be asked to build.

Few appreciate the advantages of standardization as it exists in the production of screws, bolts, lamp bases and receptacles, railway parts, track equipment, etc. The development in these lines has been a parallel factor if not an actual result of standardization. It is reasonable to expect that a concentration of attention on a single line of motors would result in a more rugged and practical motor than if a multiplicity of types demanded divided attention.

Abstract of a paper before a joint meeting of the American Institute of Electrical Engineers and the Association of Iron and Steel Electrical Engineers. Mr. Snyder is electrical engineer for the National Tube Co., McKeesport, Pa.

War Taxes Plate Shop Facilities

New Riveter Tower of Stack and Tank Shop at Erie City Iron Works Broadens Miscellaneous Fabricating Capacity

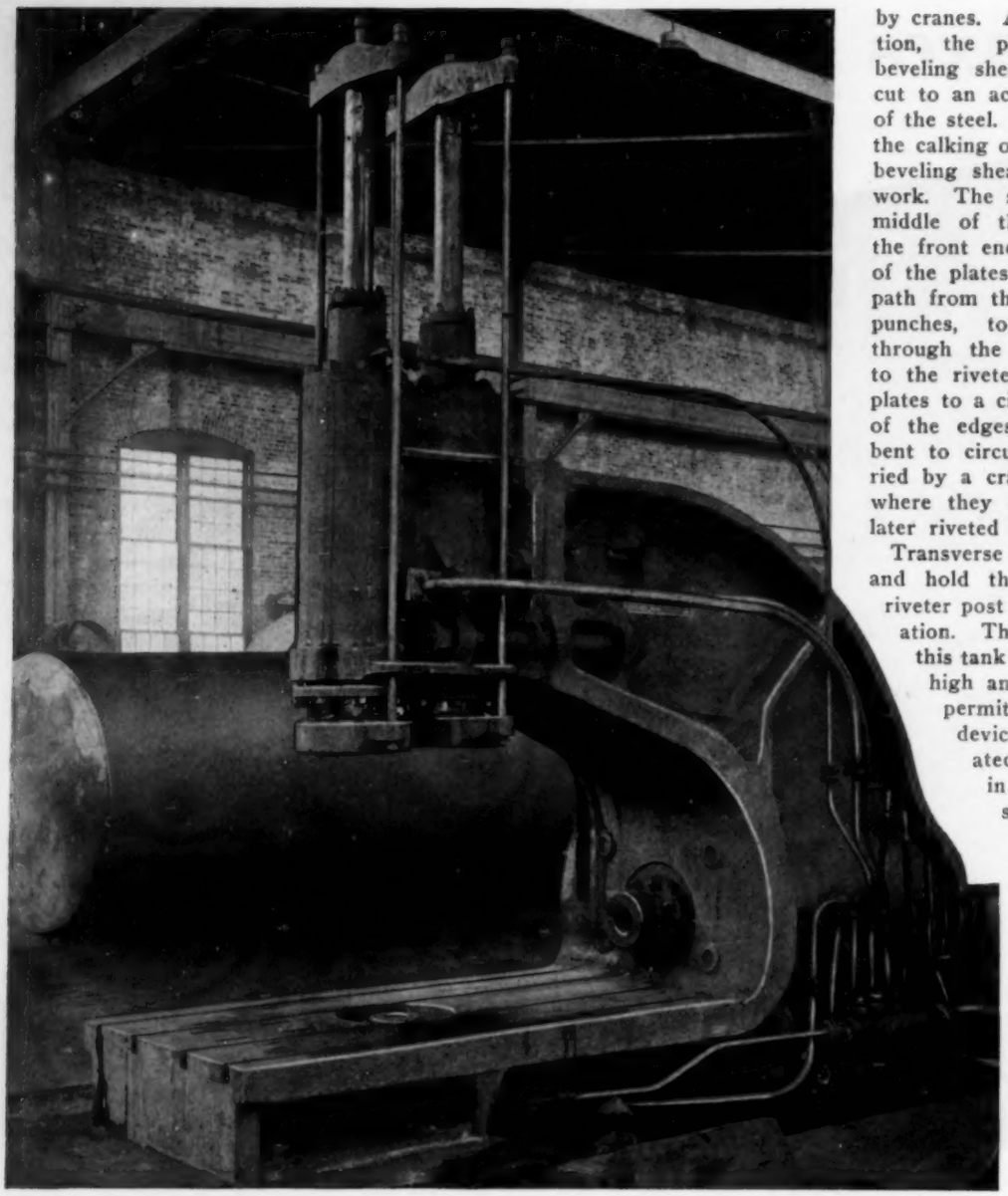


Completed Riveter Tower of New Stack and Tank Shop

MODERN war has made the fabricating shop one of the most important units of the nation's industrial line of defense. Some of the greatest undertakings which are represented in this country's far-reaching program for the upbuilding of a powerful military machine center about the capacity for plate and shape working. From a manufacturing standpoint, the great standardized ship project which now is being pushed so vigorously is a fabricating proposition both as to hull construction and as to equipment. The standardized railroad car program now about to be launched is equally so. The list of war requirements of finished steel both direct and indirect, in the supplying of which the fabricating shop plays a leading part, is a long and variegated one. As a result of these miscellaneous demands, fabricating capacity is becoming more and more taxed and the factor of flexibility of production, of the individual shop has been rendered highly important. The plant of the Erie City Iron Works, Erie, Pa., which has been considerably enlarged to increase its adaptability for war production of an auxiliary character, illustrates in its operations the function of providing a wide variety of essentials, which the plate shops now are being called upon to fill.

Illustrating the wide adaptability of the shop, the work now being carried on consists of tanks for railroad tank cars and for other purposes, smoke stacks, economizers, boiler casings, smoke connections and fabricated plates. An order for 200 tanks for railroad tank cars, each of which is of 12,500 gallons capacity and will be mounted on standard trucks, now is going through. The shop recently completed an unusually large stack for the plant of the General Electric Co., at Buffalo. This stack rises 160 feet above its foundation. It is 19 feet in diameter at the top and 30 feet at the bottom. Included in completed work are several boiler casings for the Emergency Fleet corporation. A number of large smoke connections and air ducts have also been turned out for central station units and other power houses.

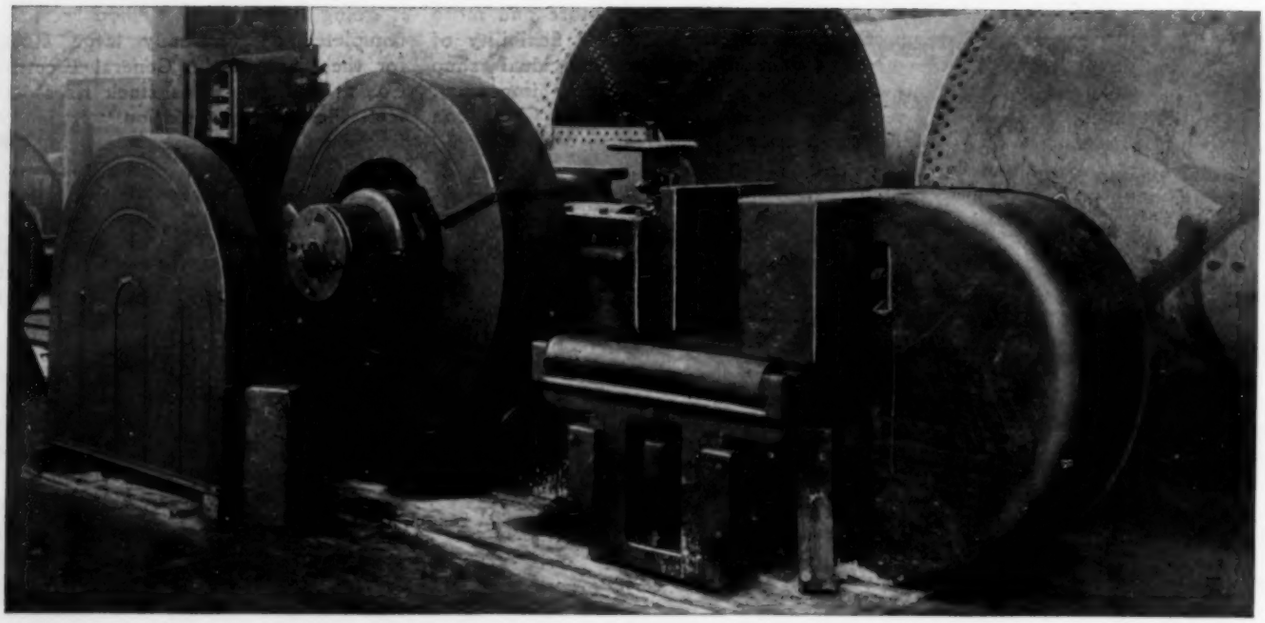
The operations involved in fabricating one of the 12,500-gallon tanks is typical of most of the work. In making these tanks, the steel is moved from the stockroom to the laying-out floor by means of small trucks running on narrow-gaged tracks. Here the plates are inspected, marked, and later punched. They are carried from the laying-out floor to the punches

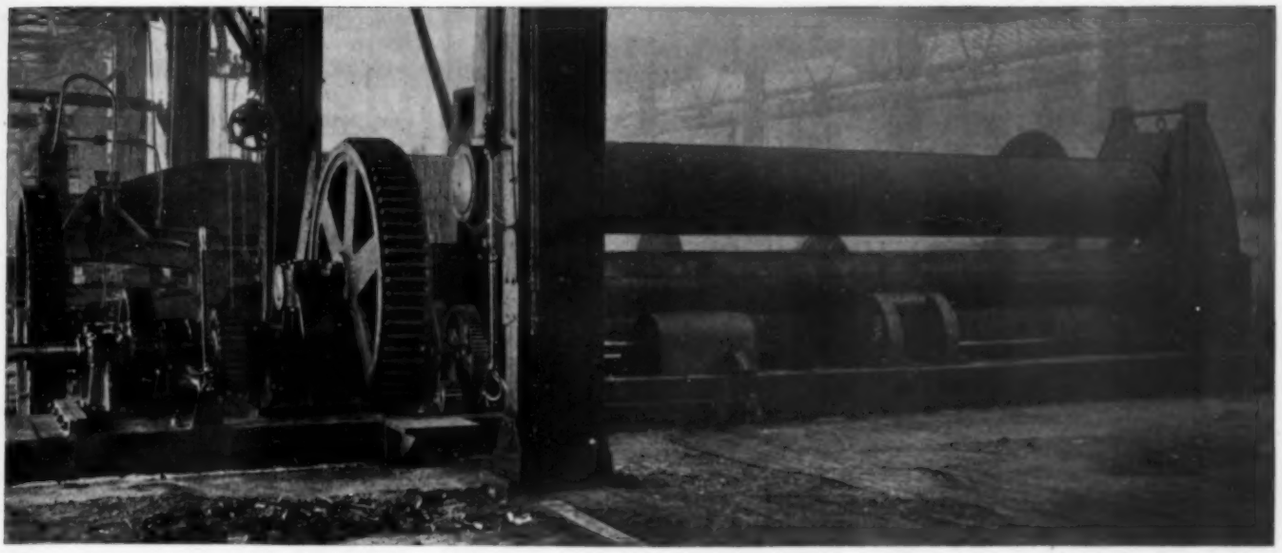


by cranes. After the punching operation, the plates are taken to the beveling shears where the edges are cut to an acute angle with the plane of the steel. This is done to facilitate the calking of joints later. Two large beveling shears are required for this work. The shears are located in the middle of the building and toward the front end, so that the movement of the plates is in an almost straight path from the laying-out floor to the punches, to the beveling shears through the bending rolls and then to the riveters. The bending of the plates to a circle follows the beveling of the edges. After the plates are bent to circular shape, they are carried by a crane to the riveter tower where they are bolted together and later riveted to the tank.

Transverse cranes pick up the plates and hold them in position over a riveter post during the riveting operation. The riveter posts used for this tank work are 18 feet 6 inches high and are sufficiently tall to permit of half a tank. These devices are hydraulically operated. The tank is built up in two sections. The next step in the process then is the fitting of the heads and the joining of the two halves.

Two hundred-ton sectional flanger recently installed in the stack and tank shop. A new shape bender having a capacity of a 20-inch I-beam is illustrated below



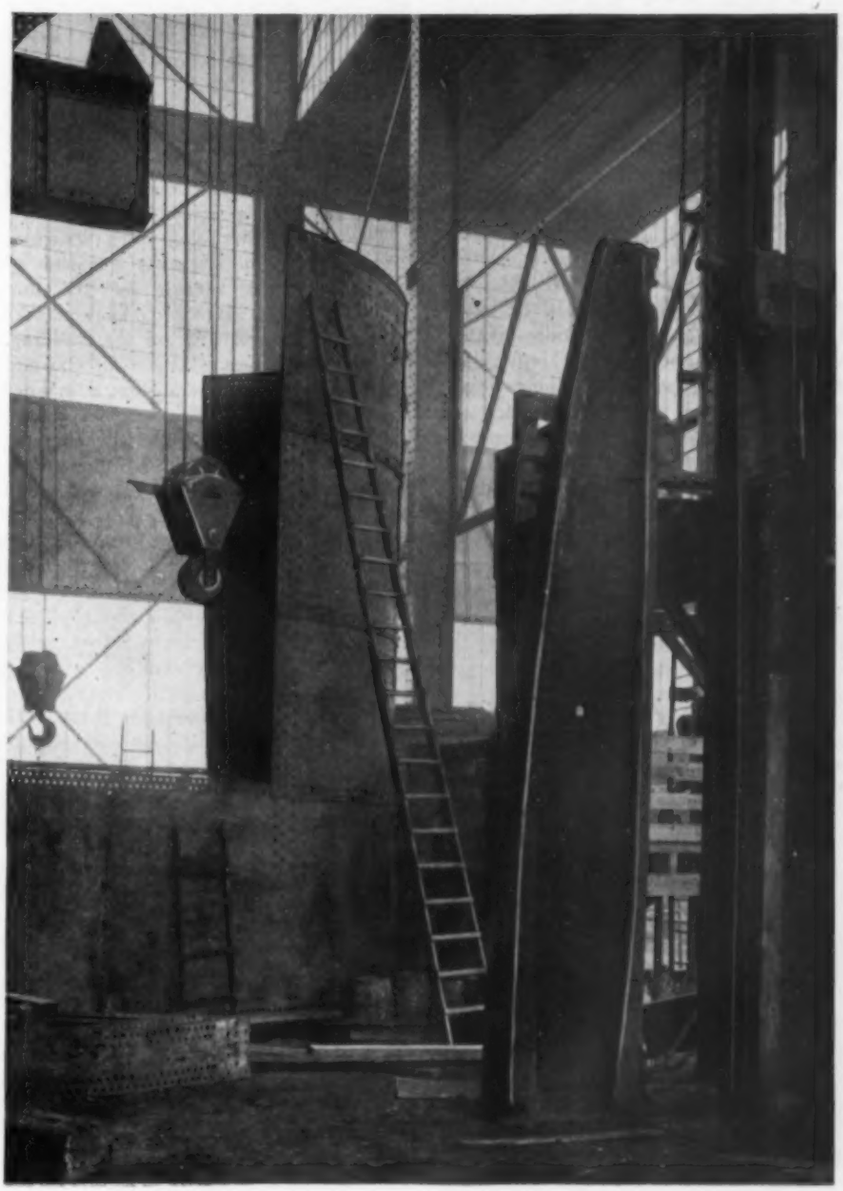


THIS NEW PLATE BENDING ROLL IN THE BOILER SHOP HAS A TOP ROLL 24 FEET LONG AND 36 INCHES IN DIAMETER—AN INTERIOR VIEW OF THE NEW RIVETER TOWER SHOWING ONE OF THE NEW 90-TON HYDRAULIC RIVETERS IS GIVEN BELOW

In the latter operation however, air riveters are used. To join the halves an air jack is used in connection with pneumatic hammers. An operator stands in the inside of the tank and holds an air jack against the rivet while a second operator hammers the rivet from the outside. Meanwhile the dome has been marked, punched, rolled and riveted by smaller machines in the shop, and is attached to the tank by pneumatic tools in a manner similar to that just described. Another step in the completion of the tank which follows is the calking of the seams with a round-nosed air hammer. After the calking has been completed, the tanks are thoroughly tested by hydraulic pressure. If no leaks develop, they then are painted and stenciled. To insure the rapid drying of the painted tank, steam is used. The shop building has been improved and enlarged by the addition of a new riveter tower, which is 25 x 100 x 80 feet high.

Considerable attention has been paid to the arrangement of equipment in the shop. Because of the wide variety of work turned out, the placing of machinery has been considered as an important factor. Stock is unloaded by means of cranes at one end of the building and is stored in racks adjacent to a narrow-gage track. This track extends into the main section of the shop. The laying-out floor is next to the stock room. Two 5-ton cranes which run the entire length of the erecting and fabricating shop facilitate the handling of all plates from machine to machine. In the new riveter tower are two 20-ton and one 15-ton cranes. These cranes run crosswise of the building and are used exclusively for handling plates and for holding them in position for hydraulic riveting.

Adjacent to the laying-out floor is a punch table of sufficient size to



punch plates ¾ inch in diameter and of any length up to 236 inches. Next in line are the two shears for beveling the edges of the tank plates. Along this same line is a set of plate bending rolls. This set of rolls is ample for the needs of the entire shop and has a capacity for rolling plates in any length up to 16 feet and to a 60-inch circle. Smaller rolls are provided for lighter work.

In the next bay, in the direction of the riveter tower, is a new shape bender of great capacity. It is driven by a direct-current electric motor through a set of reduction gears and will bend cold shapes up to 20 inches in size. This device is illustrated in an accompanying view. A new sectional flanger has just been put into operation and is in a position close to the shape-bender. The flanger has a rating of 200 tons and consists essentially of two hydraulic cylinders fitted with plungers which are actuated by water supplied under pressure from an accumulator nearby. This powerful press performs many of the drawing operations on plates used in the building of tanks of different types. Two-way valves and conveniently located hand levers centralize the control of the flanger. A view of the machine is given on page 788.

Large Riveters Employed

In the riveter tower, which is at the extreme front end of the shop, there are two large hydraulic riveters of 90 tons capacity. The stakes are 18 feet 6 inches high. Their height facilitates the building of stacks and tanks of great size. Workmen operate these riveters from platforms attached to the stakes. A third riveter, of 75 tons rating, is employed. This unit has an 8-foot stake. Similar supplementary equipment consists of a number of air riveters. These are required mainly for driving rivets in inaccessible places; that is, where the bulky head of the hydraulic device prevents its effective use.

Hydraulic power for operating this equipment is supplied by an accumulator operating in a small section of the riveter tower. The pressure exerted by the accumulator is 150 tons per square inch. Water is pumped into the accumulator cylinder by means of a two-plunger pump. The pump is gear-driven by a 75-horsepower electric motor.

Other equipment includes a battery of drills set along one wall and arranged so as to be within the working radius of nearby wall cranes. Several shears, punches and radial drills complete the list of the major shop equipment. In a balcony in the rear of the building and located over the stock racks is a small shop especially equipped for sheet metal work. One of the features of its equipment is an air riveter, provided with two arms of unusual length, to permit the assembling of small stacks in long sections.

Ample Power is Provided

The new shop is supplied with power from a unit in an adjacent machine shop. In the entire plant there are three main power units and a reserve system consisting of a motor-generator set operating on municipal current. The power capacity and distribution is such that in the event of the failure of any one of the units the two other units may be relied upon to supply sufficient current for the whole plant. The reserve motor-generator set is used only as a last expedient. The establishment of the stack and tank shop in its new location released manufacturing space in the boiler shop. This made possible the installation of considerable new equipment in that shop. The new set of bending rolls has a top roll 24 feet long and 36 inches in diameter and rolls plates 22 feet wide and 1½ inches thick to a 60-inch circle. A combined punch and shear has a capacity of punching a 4-inch hole in a 1-inch plate. Various other punching and shearing machines are included in the list of new equipment.

The main boiler shop is a structure 270x640 feet in size. It consists of six bays each served by traveling cranes. Three standard gage tracks run the entire length of the building. The riveter section is at the far end and transverse cranes operate in a manner similar to that already described in the stack and tank shop. At the extreme end of the building are the forges where boiler heads are straightened and other forge work is done.

Plate stock for boilers enters at the extreme right of the building. They are marked out in a section nearby and after a careful inspection, they are punched on a multiple punching table. This method greatly aids in securing an accurate punching of rivet holes. The ends of the shell plates, where the plates lap, are then squared off and the edges are bevel-planed on a planer. After the planing operation, the plates are passed through the bending rolls and rolled to a circular form. The boiler heads are shaped by shearing plates to size, heating them, and drawing them in an hydraulic press. The manhole flange is turned in the same manner. The tube holes in the boiler heads are reamed and chamfered with a reamer, so that all burrs are removed. After this process, the tubes are set into the heads with a roller expander and the ends are beaded over against the head. The test which is made after the boiler has been calked consists in subjecting it to an hydraulic pressure 50 per cent above its rated working pressure.

The many types of water and fire tube boilers which the company specializes in require considerable equipment. For the plate planing operation there are two plate planers. Several sets of bending rolls are utilized in addition to the large new unit. The plate and angle equipment in general is arranged either in the two middle bays or along the walls. Situated near the left wall of the shop are two hydraulic flanging presses, one of 500 tons and the other of 250 tons capacity. These presses are especially adapted to the drawing of boiler heads, and are fitted with special dies for this purpose. The tube holes in the boiler heads are reamed to size on drill presses. The heads are straightened under an hydraulic press if any irregularities in their contours exist. A third hydraulic press is included in the equipment of the shop but this is seldom used for drawing boiler heads; its chief function being in the punching of mud drums. This press is rated at 100 tons. Several hydraulic riveters are placed at the farther end of the building. Overhead traveling cranes hold the boiler plates to be riveted in position during that operation. These riveters are of different capacities and have stakes of varying heights. The 5-foot riveters are rated at 50 tons; the 10-foot, at 80 tons; the 12-foot, at 108 tons, and the largest at 150 tons. A full complement of punches, shears, drilling machines, radial drills, milling machines and shape benders, together with oxyacetylene equipment complete is also provided.

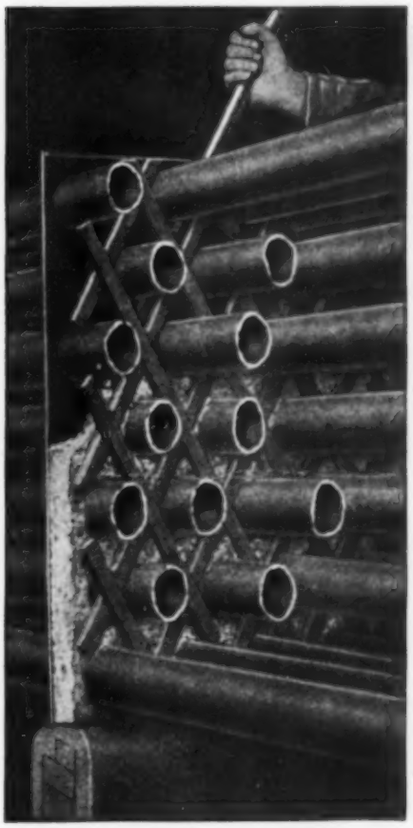
Testing the Boilers

The assembly floor is located in the main bay. The heavy assembly work is done on the testing floor so that the boilers upon completion may be tested without removal. Tracks run the full length of these bays and the boiler, after testing, may be lifted by crane and placed on a car for shipment. The smaller boilers are tested on an assembly floor near the laying-out section. Facilities are provided for transferring these boilers to cars in the same way. For testing purposes a 3-plunger, 500-pound test pump is used. This hydraulic pump is located near the flanging machines and pumps water to the two testing floors through a high pressure main.

Machine work required for boilers and boiler fittings is performed in a small, well-equipped shop at the extreme front end of the shop. Its location is close to the laying out floor. The equipment consists principally of turret lathes, thread cutting machines and drill presses.

Electric Furnace Reduces Titaniferous Ores

Process for manufacturing tool steel from titaniferous iron ores has been patented by E. H. Rothert, president of the Rothert Process Steel Co., Seattle. The process pertains both to the smelting of the ore and the subsequent refining of the metal. The company owns two mines, one in British Columbia which is 250 miles from the mill, and the other in the state of Washington which is 150 miles distant. About 400 tons of the ore are to be transported at once from the British Columbia mine by boat. The ore from this reserve analyzes 70 per cent iron and from the Washington mine 60 per cent. It is stated that the sulphur and phosphorus contents in both grades of ores are negligible. For smelting the ore a three-phase electric furnace equipped with three electrodes is used. This furnace has a melting capacity of two tons per 24 hours and is shown in the accompanying illustration together with the control board and auxiliaries. The metal is tapped into a ladle which is suspended in a pit directly under the pouring spout of the furnace. The ladle is hoisted, swung around by a jib crane and is set on a truck which operates on an elevated narrow gage track. By this means the metal is conveyed to the ingot molds. It then is passed on to the forging department. In the near future the company contemplates extending the melting building 100 feet and installing an additional electric furnace of 10 tons capacity. An 1100-pound steam hammer, of the latest type and design, and a reheating furnace also will be added to the forging department.



METHOD OF PLACING AND COMPACTING REFRACTORY WHICH IS SUPPORTED UNTIL SET BY THE FIRE

The value of the primary aluminum made in the United States in 1917 was $45,882,000, an increase of $11,982,000 over the value of that made in 1916.

Plastic Baffle Refractory for Boilers

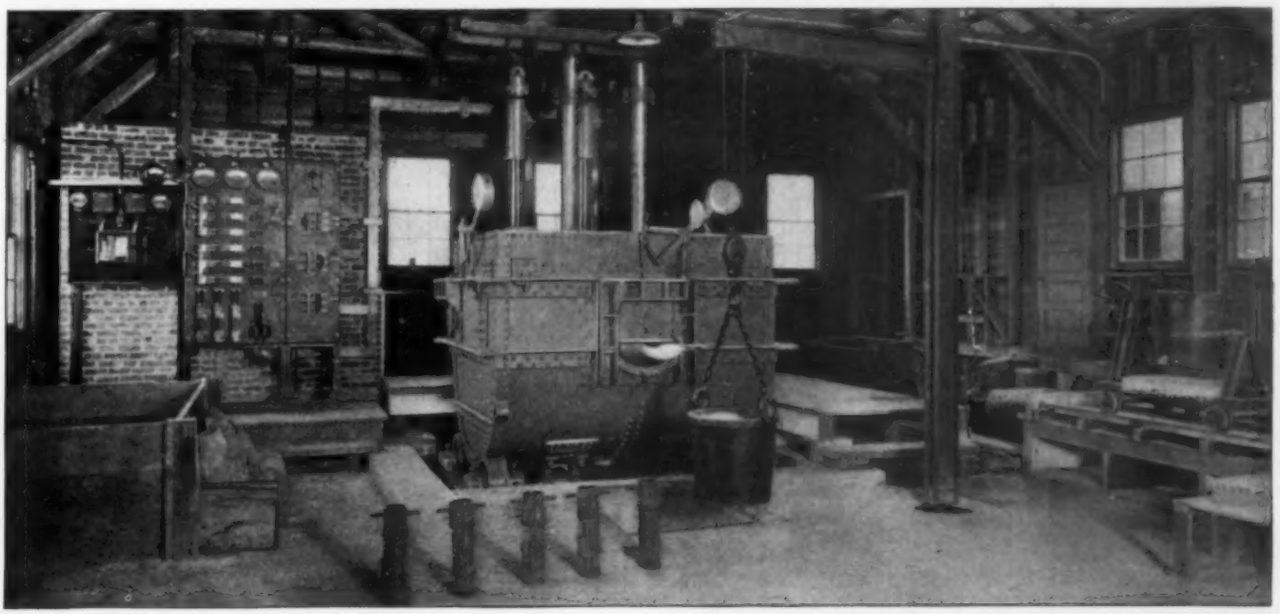
A plastic refractory for boiler baffles, said to be impervious to the hot gases which are constantly passing through the baffles, was recently developed by the Betson Plastic Fire Brick Co., Rome, N. Y.

In forming a cross baffle for a water-tube boiler, the ordinary cast-iron baffle plate is used as one side of the mold. The other side is made by thrusting slats in through the diagonals between the tubes, as shown in the accompanying illustration. The refractory is poked down through the diagonals to fill the space between the cast-iron baffle plate and the slats. The refractory is said to be sufficiently plastic to be found sidewise around the tubes.

When this work has been completed the boiler is fired up slowly, the criss-cross of slats burned out, and the refractory vitrified in place. The operation requires only a few hours, after which the full load may be placed upon the boiler.

The position of the refractory is claimed to regulate itself automatically. Inasmuch as the boiler comes up to full steam capacity before the material is set, the latter is pushed away by the hot metal to the position which it should occupy when the boiler is hot. While the metal will draw away from the refractory in cooling, the baffles it is said will always fit tightly.

In forming a longitudinal baffle, blocks of wood are placed between the tubes, above and below the space which the baffle is designed to occupy, thus confining the plastic material which may be inserted by the most convenient method.



INTERIOR VIEW OF MELTING PLANT, SHOWING THE 2-TON ELECTRIC FURNACE AND CONTROL

Ford is Pushing Tractor Industry

Temporary Plant Now Producing Numerous Machines of Perfected Model for Government Use and Output is to be Increased Swiftly—Great New Works Planned —Materials and Design of Tractor Are Novel

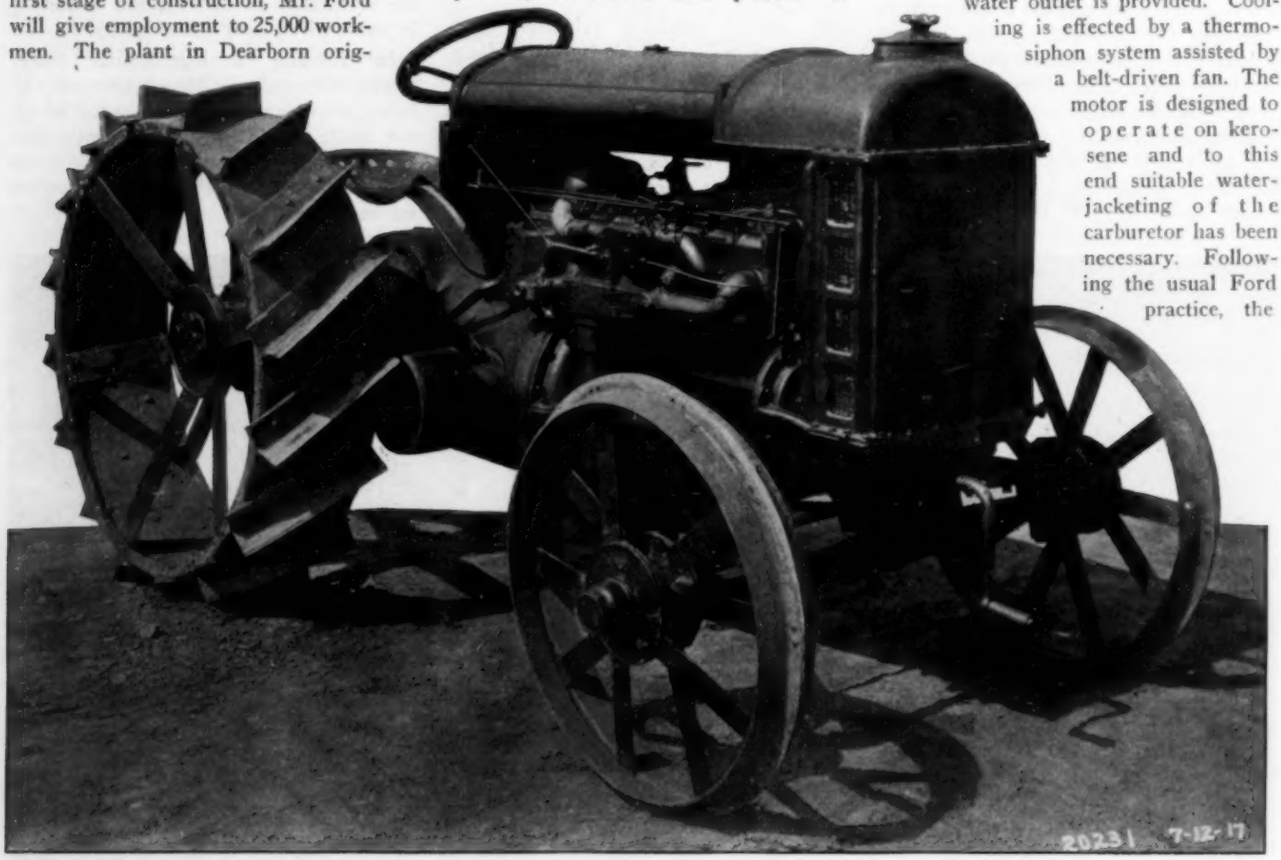
DETROIT, March 26.—Production of Fordson farm tractors at the temporary plant of Henry Ford & Son, in Dearborn, a suburb of Detroit, will be increased from 80 to 150 a day by May 1. The entire production for 1918 is placed at 50,000, most of which will be made available for use in this country. The machine is reported to be in great demand among farmers in spite of the fact that it has not yet been placed on the market in this country. All that have so far been manufactured have been sent to England there to help solve the food problem. Henry Ford believes the tractor is destined to create one of the world's leading industries. He plans to devote most of his time in developing his own tractor business to a point where he eventually will employ 100,000 men in the manufacturing, assembling, service and distribution.

In the proposed tractor plant, covering a town-site on the River Rouge, adjoining his steel mills now in the first stage of construction, Mr. Ford will give employment to 25,000 workmen. The plant in Dearborn originally was built for experimental purposes. It is now employing 2000 men. In all 50 models were produced before the perfected machine was turned out. The plant and equipment represents an investment of $3,500,000 and is complete except for an office building, 192 x 70 x 40 feet, which now is being erected.

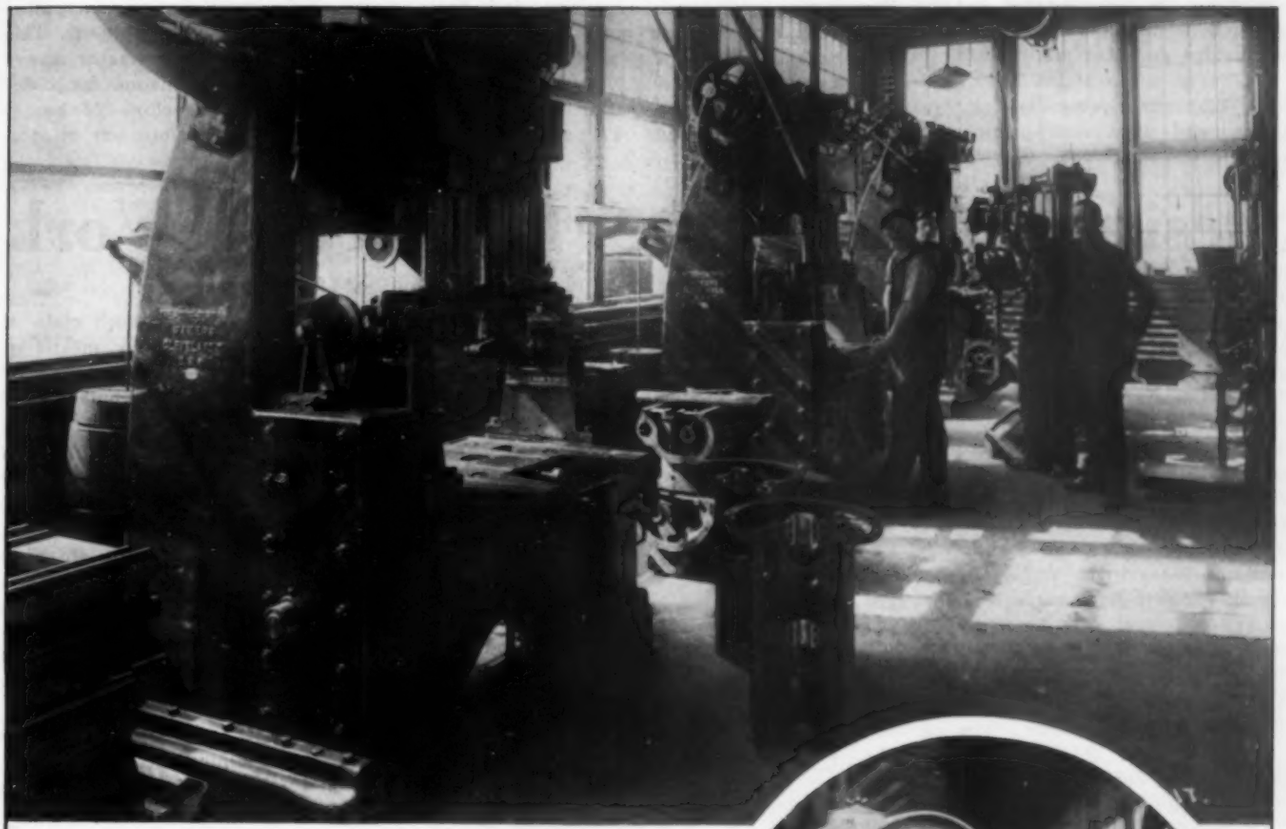
The plant includes a foundry, 120 x 225 feet; stock room, 30 x 100 feet; heat treating room, 40 x 145 feet; assembly shop, 44 x 165 feet; pattern shop, 50 x 105 feet; gas producer plant, 54 x 45 feet; power plant, 70 x 45 feet; machine shop, 285 x 75 feet, and another machine shop, 225 x 90 feet.

The wheels of the tractor are of hot rolled steel; the front axle of high carbon steel; the bearings and bearing races of chrome steel; the worm wheel of aluminum bronze; the clutch shaft, transmission gears, transmission shafts, axle shafts and worm gears of chrome-vanadium steel; the cylinder, crankcase and pistons of semisteel; the crankshaft, connecting rods and piston pins of chrome-vanadium steel; the main bearings of babbitt cast in steel caps; the valve heads of cast iron; the valve stems of carbon steel; the camshaft and valve tappets of 0.15 carbon steel, and clutch plates of 0.40 carbon steel.

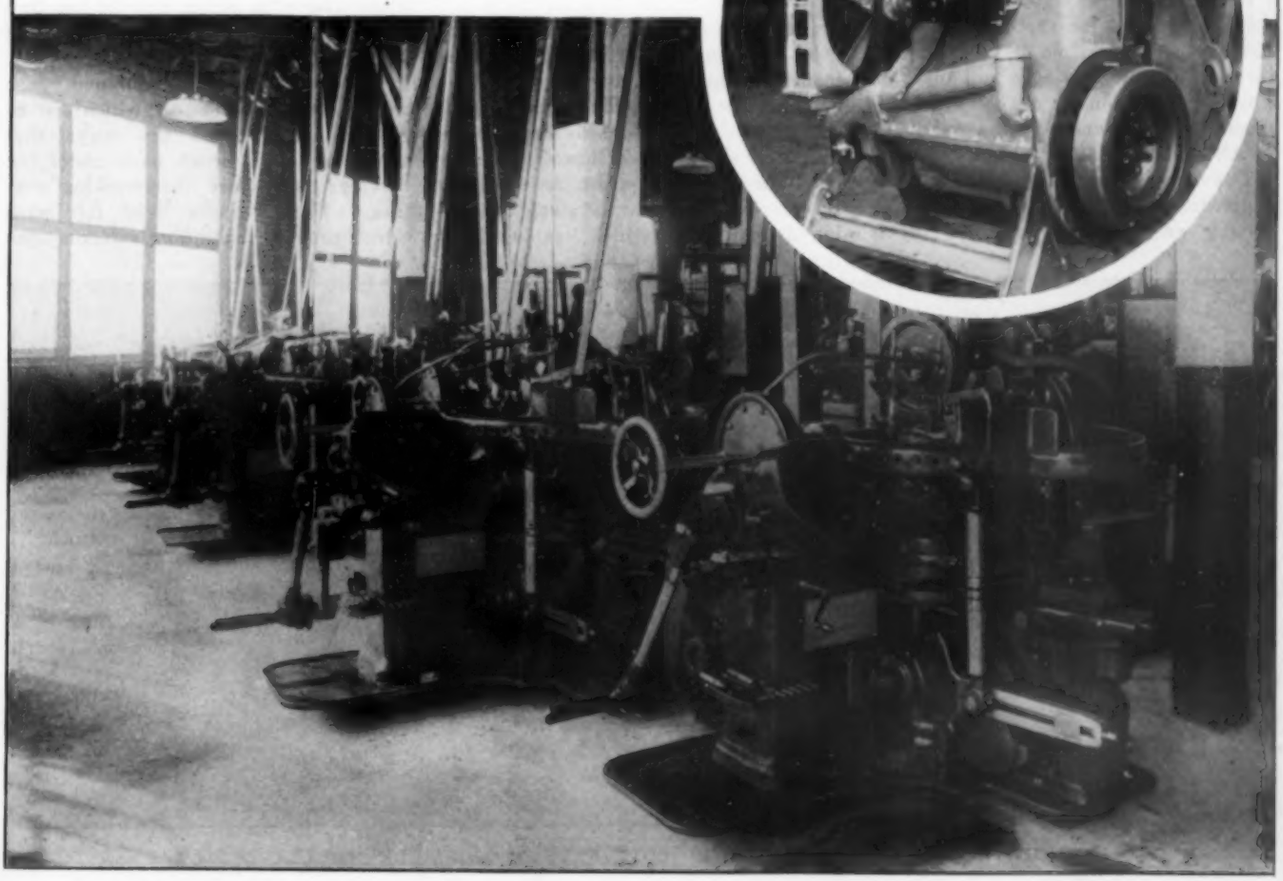
Although the tractor motor is more ruggedly built than the standard engine used in the automobile, many of its characteristics bear out the the essential Ford principles of design. The engine has four cylinders cast integral with the upper half of the crankcase. These cylinders are of the conventional L-head type. The cylinder heads may be taken off easily for removing carbon from the interior walls, as the heads are cast in one block and save for the disconnection of the water outlet, it is only necessary to take out the cap screws that hold the cylinder heads in place. Instead of the conventional flexible connection between the radiator and cylinders, a rigid cast iron water outlet is provided. Cooling is effected by a thermo-siphon system assisted by a belt-driven fan. The motor is designed to operate on kerosene and to this end suitable water-jacketing of the carburetor has been necessary. Following the usual Ford practice, the



THE FORDSON FARM TRACTOR



Three glimpses in the Fordson plant. The upper illustration shows a special battery of special cylinder boring machines while the lower view was taken in the gear-cutting department. The insert illustrates the assembled tractor motor.



magneto is incorporated in the flywheel, where it is secure from dirt, moisture and damage.

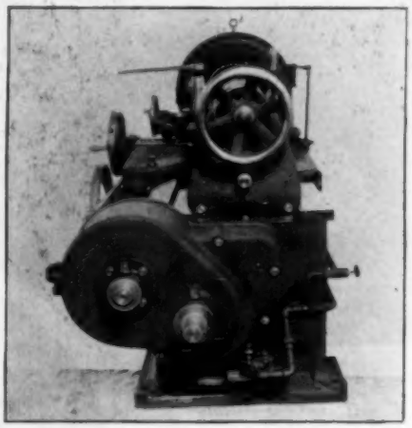
One of the features of the design is the three-point motor suspension and the incorporation of the motor, differential housing and the rear axle in one unit. The advantage of this system is that a straight line drive from the motor to axle without the interposition of universal joints is obtained. Through one side of the differential housing a pulley shaft fitted with a pulley projects. This arrangement enables the tractor owner to use it for miscellaneous farm duties. The motor develops 22 horsepower at 1000 revolutions per minute.

Designs Axle Lathe for Heavy Work

THE lathe shown in the accompanying illustrations was designed by the Niles-Bement-Pond Co., New York, for turning locomotive and railroad car axles, either from rough or semifinished forgings. The work is driven from the center so that wheel seats and journals at both ends of the axle can be finished simultaneously. The lathe was designed for a high production machine and it is of rigid construction throughout.

The bed is reinforced by box-section cross girts 8 inches wide and all sections are of sufficient proportions to insure rigidity. The carriage tracks consist of a flat way at the back and compensating V-shape at the front. The angle of the V-shape track is 15 degrees at the back and 70 degrees at the front. This construction is shown in the end view of the lathe. The 15-degree angle serves a double purpose as it presents a thrust surface at right angles to the combined forces of the turning tools and at the same time it compensates for wear on the carriages and the bed. This construction is designed to eliminate the tendency of the carriages to climb under heavy cuts.

The center-drive head is of heavy construction. It encloses the main driving gear entirely and also forms an oil reservoir for lubricating the gear. The head is fastened to the bed by six bolts and it has a longitudinal adjustment along the bed. The drive is operated through a steel herringbone-type gear and pinion. These



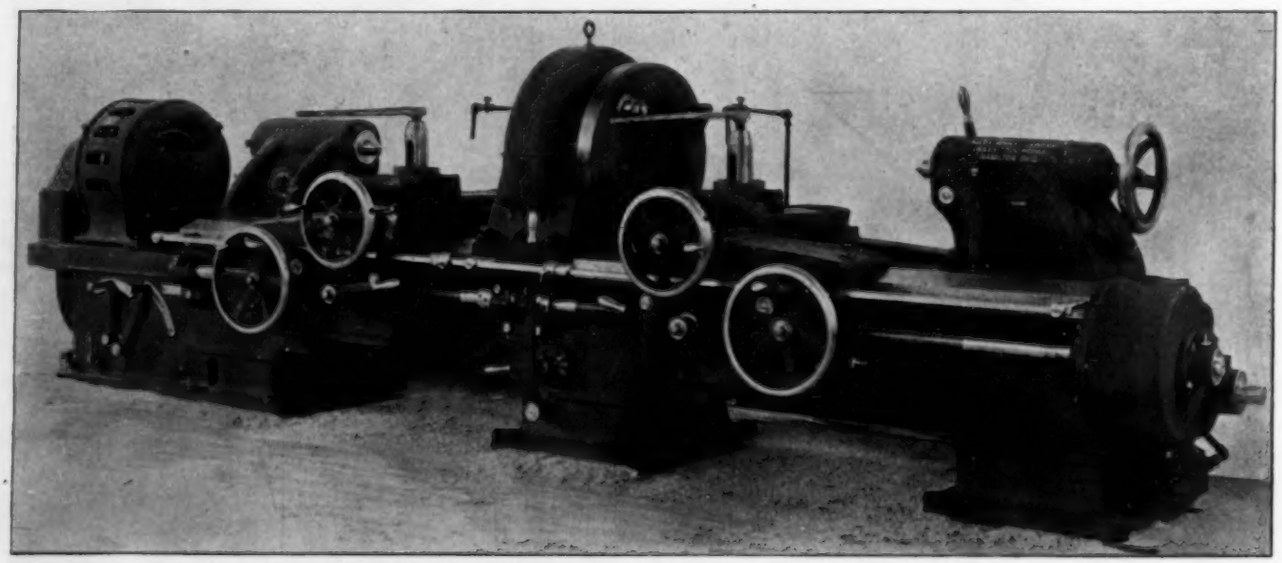
CROSS-SECTION OF V-TRACK

are carried between bearings in the head. These bearings are large, thus insuring long life, and provision has been made for a sufficient supply of oil. The drive is said to be smooth, owing to the spiral action of the herringbone gearing. The axle to be turned is rotated by a steel equalizing driving plate which has lugs cast integral. These engage both ends of a double driving dog. By means of this type of driving plate, crooked or irregular axles can be machined readily without setting up bending strains.

The lathe is provided with two carriages. These have longitudinal feeds by positive gear-driven, right and left-hand screws. The carriages are equipped with automatic stopping devices which are adjustable. When the carriages come in contact with the stops, which consist of set collars, the split nuts that encircle the feed screws are thrown open, thus arresting the travel of the carriages.

The carriages are held down by full-length clamping strips and the front and back vertical surfaces are adjustable by means of taper gibs. At the front of the carriages, two clamps are provided. One of these is utilized for clamping the carriage to the bed when turning up to shoulders and facing ends of axles. The other clamp is under the bridge and decreases the tendency of the carriage to lift during burnishing operations.

The carriages are equipped with wipers, the object of which is to remove chips from the ways that otherwise might work back under the carriage and score the working surface. These wipers have felt pads which provide the sliding surfaces with



AXLE LATHE DESIGNED FOR TURNING BOTH ENDS OF THE WORK SIMULTANEOUSLY

lubricant at all times. The lubricating system for the tools consists of a pump, jet pipes, reservoir and collecting channels. The tool slides are provided with a trough which is connected with channels in the carriage bridge for carrying off the lubricant. The carriage aprons are of double-wall construction and all the mechanism with the exception of the operating levers is enclosed. All shafts are supported by journals at both ends.

The feed gears are located at the right-hand end of the bed and they are entirely enclosed. The feed-change lever is placed at the center of the lathe within easy reach of the operator. Three feeds are provided for the carriage, 1/16, 3/32 and 3/16 inch per one revolution of the work. The carriages have hand traverse on the bed and the tool slides are equipped with hand cross feeds.

Lathe Has Two Tailstocks

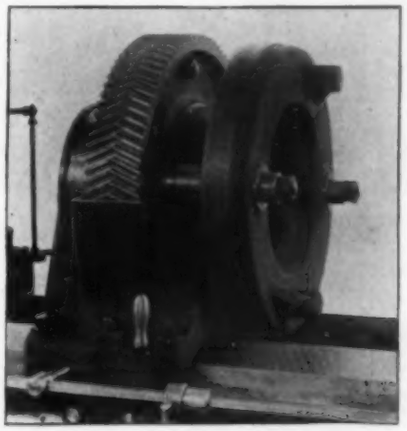
The axles are carried on dead centers mounted in two heavy tailstocks. The tailstocks are adjustable longitudinally along the bed to accommodate axles of different lengths and are clamped in place, as occasion requires, through the medium of four large anchor bolts. A pawl, which engages a cast rack in the bed, is provided to prevent slipping under heavy loads. The tailstocks have taper gibs at the front and back of the bed which permit alignment of the spindles. The spindle of the right-hand tailstock is provided with a hand wheel for purposes of adjustment.

The lathe can be equipped with any one of four different drives: Cone-pulley drive, single-pulley drive, constant-speed motor drive and adjustable-speed motor drive. With the cone-pulley drive, the lathe is driven by a 3-step cone which has a maximum diameter of 32 inches and takes a 7-inch belt. A 2-speed countershaft is provided which gives six speeds to the driving head. These range from 16 to 48 revolutions a minute. A break is also provided which is operated by a foot pedal.

With the single-pulley drive, the driving pulley is 26 inches in diameter for an 8-inch belt. The drive is through a speed box mounted at the left-hand end of the bed. The speed box transmits four speeds which range from 16 to 48 revolutions a minute. The gears are steel and run in oil and all the bearings are lubricated automatically.

For starting and stopping the lathe, a friction clutch is provided. This clutch is mounted inside the driving pulley and is operated by a lever located at the center of the machine. When the clutch is disengaged, a brake is automatically applied which brings the lathe to a quick stop.

For use with alternating current, a constant-speed motor drive is employed. The motor is mounted on the speed box at the left-hand end of the bed as shown in the large illustration. Power is transmitted by gearing from the speed box to the driving shaft. There are four speed changes which range from 16 to 48 revolutions a minute. The speed box gears are steel and run in oil and all bearings are lubricated automatically. Starting and stopping is controlled by means of a friction clutch similar to the one used with the single pulley drive. In this case, however, the clutch is mounted inside of the speed box driving gear.



HERRINGBONE DRIVING GEAR

The adjustable-speed motor, used with direct current, is mounted on a base plate attached to the left-hand end of the bed. This motor is geared directly to the driving shaft and gives speeds to the driving head ranging approximately from 16 to 48 revolutions a minute.

Large Orders

For Railroad Cars Are Placed By The Canadian Government

Toronto, March 23.—The Canadian government has awarded contracts for rolling stock for the government railways including the Canadian Northern, amounting in all to about $22,500,000. The orders are allotted as follows: Canadian Car & Foundry Co., 5000 40-ton steel frame box cars, 450 40-ton wood ballast cars and 300 30-ton stock cars, making a total of about $16,000,000. Eastern Car Co., Trenton, N. S., 750 40-ton steel flat cars and 650 50-ton steel coal cars, making a total of $3,750,000. National Steel Car Co., Hamilton, 1000 40-ton steel frame box cars, amounting to about $2,750,000.

Contracts for the 150 locomotives required and for refrigerator, tank and passenger cars have not yet been awarded.

Details of the Canadian government's plan for assisting in meeting the need of the allies for merchant ships were given by Sir Robert Borden, prime minister, in the course of a speech in the house of commons on March 19. Already much has been done in Canada by the imperial government, through the imperial munitions board. Orders have been placed by the board for 43 steel ships with a total tonnage of 211,300 tons and for 46 wooden vessels aggregating 128,400 tons. The total value of these vessels is $64,500,000. Twelve shipyards are now working on orders for the imperial munitions board and their capacity is being brought up to approximately 250,000 tons a year. Berths vacated by the completion of ships ordered by the board will be utilized at once by the dominion government. Four cargo steamers with a total of 23,500 tons are to be completed and placed in commission this year. Next year, however, 50 steel ships are to be constructed. During his speech the prime minister expressed his thanks to the United States government for providing that the Canadian government might obtain 80,000 tons of ship plates and angles to meet shipbuilding requirements this year. These materials are to be supplied at the same price as to the United States government.

At the recent organization meeting of the Manitoba Steel & Iron Co., Ltd., Winnipeg, T. R. Deacon was made president, H. B. Lyall, vice president, and Walter Stuart, secretary. The company which recently took out a Dominion charter, with $500,000 capital stock, will take over the merchant end of the business of the Manitoba Bridge & Iron Works, to carry on a general merchant business in heavy steel goods, such as structural steel, plates, and sheets, railway supplies, mining equipment, heavy forging billets and shipbuilding material. A block of land has been secured with a suitable warehouse, and under the charter, authority has been given to build and operate rolling mills, blast furnaces, etc. The Manitoba Bridge & Iron Works proposes to confine its operations more to the manufacturing end and is applying for incorporation under the Dominion government with $1,000,000 capital stock.

The Bird Coal & Iron Co. is planning to blow in its furnace at Talladega, Ala., about May 1.

Railway Show Best Despite War

That widely varied industries are allied through the railway use of their products may be noted from the firm names over some of the exhibits at the Railway Appliance show held in the Coliseum at Chicago during last week.

The exhibit spaces were prepared with close attention to the importance of artistic effects. The utilitarian character of the equipment shown was submerged in an effort to increase the pleasing and artistic appearance of the entire display enclosure.

Traffic considerations and the imperative need for continuous railway operation gave added interest to those exhibits showing track fastenings and appliances which increase the factor of safety in track and roadway work.

DESPITE the fact that American railroads are now under federal control, the exhibition of the National Railway Appliances association, held in conjunction with the meeting of the National Railway Engineering association, was fully as complete and instructive as those of former years. The show was held last week at the Coliseum in Chicago and over 150 of America's large industries displayed their products. Adopting a rough classification, the exhibits were divided in two general classes—safety and signaling appliances, made up of compressed air and electrical devices used in operating trains and in protecting crossings; and rails and track appliances. The exhibit of the Associated Manufacturers of Malleable Iron—part of which is shown in the upper left hand corner of this page—was one of the most interesting of the entire show. This association presented a diversified line of malleable castings adapted for railroad work and demonstrated their strength on wedge-testing machines, miniature pile drivers and other testing devices. The Coliseum was handsomely dressed for the occasion in the national colors. Pictures of the national leaders were displayed in many prominent positions.

Pig Iron Production in United States, 1917

(Compiled by the American Iron and Steel Institute)

PRODUCTION OF PIG IRON BY GRADES, 1900-1917.

Years	Basic.	Bessemer.	Foundry.	Malleable.	Forge.	All other.	Total. Gross tons.
1900.	1,072,376	7,979,327	3,376,445	173,413	793,092	394,589	13,789,242
1901.	1,448,850	9,596,793	3,548,718	256,532	639,454	388,007	15,878,354
1902.	2,038,590	10,393,168	3,851,276	311,458	833,093	393,722	17,821,307
1903.	2,040,726	9,989,908	4,409,023	473,781	783,016	312,798	18,009,252
1904.	2,483,104	9,098,659	3,827,229	263,529	550,836	273,676	16,497,033
1905.	4,105,179	12,407,116	4,758,038	635,236	727,817	358,994	22,992,380
1906.	5,018,674	13,840,518	4,773,011	699,701	597,420	377,867	25,307,191
1907.	5,375,219	13,231,620	5,151,209	920,290	683,167	419,856	25,781,361
1908.	4,010,144	7,216,976	3,637,622	414,957	457,164	199,155	15,936,018
1909.	8,250,225	10,557,370	5,322,415	658,048	725,624	281,789	25,795,471
1910.	9,084,608	11,245,642	5,260,447	843,123	564,157	305,590	27,303,567
1911.	8,520,020	9,409,303	4,468,940	612,533	408,841	229,910	23,649,547
1912.	11,417,886	11,664,015	5,073,873	825,643	469,183	276,337	29,726,937
1913.	12,536,693	11,590,113	5,220,343	993,736	324,407	300,860	30,966,152
1914.	9,670,687	7,859,127	4,533,254	671,771	361,651	235,754	23,332,244
1915.	13,093,214	10,523,306	4,843,899	829,921	316,214	309,659	29,916,213
1916.	17,684,087	14,422,457	5,553,644	921,486	348,344	504,779	39,434,797
1917.	17,671,662	13,714,732	5,328,258	1,015,579	345,707	571,459	38,647,397

PRODUCTION OF PIG IRON BY STATES, 1913-1917.

States.	1913.	1914.	1915.	1916.	1917.
Mass., Conn.	12,810	6,594	7,802	5,719	10,527
New York, New Jersey	2,187,620	1,559,864	2,104,780	2,352,535	2,417,527
Pennsylvania	12,954,936	9,733,369	12,790,668	16,506,284	15,539,728
Maryland	289,959	195,594	251,548	501,452	422,212
Virginia	341,815	271,228	251,346	399,885	520,311
Alabama	2,057,911	1,826,929	2,049,453	2,762,885	2,953,705
West Virginia, Kentucky, Georgia, Mississippi	315,731	236,393	291,040	554,590	561,951
Tennessee	280,541	216,738	177,729	355,374	369,951
Ohio	7,129,525	5,283,426	6,912,962	8,602,895	8,518,603
Illinois	2,927,832	1,847,451	2,447,220	3,922,512	3,483,096
Indiana, Michigan	1,775,883	1,557,355	1,986,778	2,221,708	2,657,503
Wisconsin, Minn.	367,326	329,526	372,966	811,325	738,541
Mo., Ia., Col., Wash., Cal.	324,263	267,777	271,921	437,633	453,742
Total	30,966,152	23,332,244	29,916,213	39,434,797	38,647,397

TOTAL PRODUCTION OF PIG IRON ACCORDING TO FUEL USED.

Coke*	335	307	95	402	18,874,680	19,015,144	37,889,824
Anthracite†	13	15	5	20	203,320	177,728	381,048
Charcoal‡	19	18	17	35	180,235	196,290	376,525
Total	367	340	117	457	19,258,235	19,389,162	38,647,397

*Includes ferro-alloys made with electricity.
†Includes mixed anthracite and coke pig iron.
‡Includes small tonnage made with charcoal and coke.

PIG IRON MADE FOR SALE OR FOR USE OF MAKERS IN 1917.

Grades.	For sale.	For maker's use.	Total. Gross tons.
Basic	2,614,875	15,056,787	17,671,662
Bessemer and low-phosphorus	2,406,742	11,307,990	13,714,732
Foundry, including ferro-silicon	5,186,498	141,760	5,328,258
Malleable	1,014,025	1,554	1,015,579
Forge or mill	128,061	217,646	345,707
Ferro-manganese	132,068	153,932	286,000
Spiegeleisen	144,036	49,255	193,291
All other grades	50,208	41,960	92,168
Total Gross tons.	11,676,513	26,970,884	38,647,397

PRODUCTION OF COLD AND HOT AND WARM BLAST CHARCOAL PIG IRON, 1913-1917.

Kinds of iron.	1913.	1914.	1915.	1916.	1917.
Cold blast	10,222	9,294	5,302	5,323	5,219
Hot and warm blast*	329,759	254,630	290,850	367,088	371,306
Total	339,981	263,924	296,152	372,411	†376,525

* Includes iron made with charcoal and electricity from 1913 to 1915, inclusive.
† Includes small tonnage of pig iron made with charcoal and coke mixed in 1917.

HALF-YEARLY PRODUCTION OF BASIC PIG IRON.

States.	First half of 1917.	Second half of 1917.	Total 1917.
New York, New Jersey	535,286	627,367	1,162,653
Pennsylvania—Allegheny County	1,797,309	1,901,228	3,698,537
—Other counties	2,330,237	2,320,621	4,650,858
Virginia, Alabama, Kentucky	770,667	748,795	1,519,462
Ohio	1,412,324	1,575,056	2,987,380
Indiana, Illinois	1,466,677	1,610,138	3,076,815
Michigan, Minn., Missouri, Col., Wash.	308,104	267,853	575,957
Total	8,620,604	9,051,058	17,671,662

PRODUCTION OF PIG IRON BY GRADES, 1916-1917, SHOWING INCREASE OR DECREASE BY GRADES.

Grades.	1917.	Per cent.	1916.	Per cent.	Increase.	Per cent.
Basic	17,671,662	45.72	17,684,087	44.85	*12,425	*0.07
Bessemer and low phosphorus	13,714,732	35.49	14,422,457	36.57	*707,725	*4.91
Foundry and ferro-silicon	5,328,258	13.79	5,553,644	14.08	*225,386	*4.06
Malleable	1,015,579	2.63	921,486	2.34	94,093	10.21
Forge	345,707	.89	348,344	.88	*2,637	*.76
Spiegeleisen	193,291	.50	194,002	.49	*711	*.37
Ferro-manganese	286,000	.74	221,532	.56	64,468	29.10
All other	92,168	.24	89,245	.23	2,923	3.28
Total	38,647,397	100.00	39,434,797	100.00	*787,400	*2.00

*Decrease.

PIG IRON MADE FOR SALE BY GRADES IN 1917.

States.	Bessemer.	Basic.	Forge.	Foundry.	Malleable.	All other.	Total. Gross tons.
Mass., Conn.	.....	.....	.....	10,007	.....	.....	10,007
N.Y., N.J., Md.	334,577	162,483	6,429	579,569	149,375	29,025	1,261,458
Pennsylvania	1,328,821	739,666	48,410	912,426	75,227	189,253	3,293,803
Va., W. Va., Ala.	9	439,610	61,381	1,800,871	.....	33,391	2,335,262
Ky., Tenn., Ga.	116,554	.....	3,223	398,022	.....	6,020	523,819
Ohio	308,470	1,050,677	8,618	647,192	430,416	588	2,445,961
Ind., Ill.	237,732	133,781	.....	90,973	220,011	52,976	735,473
Mich., Wis., Minn., Mo., Iowa, Col., Wash., Cal.	80,579	88,658	.....	747,438	138,996	15,059	1,070,730
Total	2,406,742	2,614,875	128,061	5,186,498	1,014,025	326,312	11,676,513

METHODS BY WHICH ALL PIG IRON WAS CAST OR DELIVERED.

States.	Molten condition.	Sand cast.	Machine cast.	Chill cast.	Direct castings.	Total. Gross tons.
Mass., Conn.	.....	10,527	.....	.....	.....	10,527
N. Y., N. J., Md.	1,560,474	569,977	565,544	143,213	531	2,839,739
Pennsylvania	10,434,070	1,293,287	3,101,486	700,982	9,903	15,539,728
Va., W. Va., Ala., Ga., Ky., Tenn.	1,172,356	2,511,003	490,848	220,677	11,034	4,405,918
Ohio	4,797,365	1,230,811	2,214,143	266,372	9,912	8,518,603
Ind., Ill., Mich., Col., Wis., Minn., Mo., Ia., Wash., Cal.	5,229,174	622,962	1,277,663	201,331	1,752	7,332,882
Total	23,193,439	6,238,567	7,649,684	1,532,575	33,132	38,647,397

METHODS BY WHICH BAFIC PIG IRON WAS CAST OR DELIVERED IN 1917.

States.	Sand cast, machine cast, chill cast, etc.	Molten condition.	Total. Gross tons.
New York, New Jersey	230,452	932,201	1,162,653
Pennsylvania	1,742,899	6,606,496	8,349,395
Alabama, Virginia, Kentucky	547,878	971,584	1,519,462
Ohio	1,050,264	1,937,116	2,987,380
Indiana, Ill., Mich., Minn., Mo., Col., Wash.	403,569	3,249,203	3,652,772
Total	3,975,062	13,696,600	17,671,662

Bessemer Loss

Greatest in 1917 Iron Output According to Official Data

Pig iron production in the United States during **1917 is placed** by t American Iron and Steel institute at 38,647,397 tons. This total, as given in a bulletin just issued, covers all grades of pig iron including charcoal, ferroalloys and the product of electric furnaces. In 1916, the total tonnage amounted to 39,434,797, a loss for last year of 787,400 tons.

A comparison of the production figures according to fuel used indicates this loss was due entirely to the coke furnaces, which produced 37,889,824 tons in 1917, a loss of 954,774 tons compared with the 1916 total of 38,844,598 tons. The anthracite stacks last year showed a gain of 163,260 tons, producing 381,048 tons in 1917, compared with only 217,788 tons in 1916. Charcoal furnaces also registered a gain, with a total production of 376,525 tons, or 4114 tons more than the 1916 total of 372,411 tons.

By grades, the heaviest loss was in bessemer iron. The output of this grade amounted to 13,714,732 tons, compared with 14,422,457 tons in 1916, a loss of 707,725 tons. The basic total last year amounted to 17,671,662 tons, or 12,425 tons less than the 1916 figure of 17,684,087 tons. Both forge and foundry grades show a loss, the foundry figures being 5,553,644 tons and 5,328,258 tons in 1917 and 1916, respectively, a loss of 225,386 tons.

The last half of the year, with a production of 19,389,162 tons, shows a gain of 130,927 tons over the first half total of 19,258,235 tons. Basic production for the second half was 9,051,058 tons, compared with 8,620,-604 tons in the first half, a gain of 430,454 tons. The gain in the production of foundry iron in the last half amounted to 123,362 tons, the total tonnage produced in that period being 2,725,810, while the first six months' total was 2,602,448 tons. In the July to December period, 6,-673,306 tons of bessemer pig iron were produced, a loss of 368,120 tons compared with the January-June total of 7,041,426 tons.

The tables on the opposite page show in detail the pig iron production figures for 1917 as collected by the institute.

Skilled mechanics from Cleveland, Detroit and other industrial centers are being called to care for the great air fleet which the United States has begun to send abroad. More than 2500 airplanes are now ready to take to the air on the other side and with 46 men required on the ground for every man in the air, 115,000 men are required immediately. With 10,000 planes as a minimum for this country's contribution, an army of at least 460,000 mechanics must be recruited.

Labor Problems

During and After War to be Studied at Conference

Labor problems under war conditions will be considered from practically every angle at an important national conference to be held at the Hotel La Salle in Chicago, March 27 to 29, by the Society of Industrial Engineers and the Western Efficiency society. The topics of woman in industry, the substitution of man power by mechanical equipment, the realization of maximum output from the men remaining in nonmilitary pursuits and the readjustments in the industrial field that will take place upon the return of the army to civil life will be studied. In connection with the conference an exhibit will be held of labor-saving factory equipment and modern office devices.

The detailed program of the meeting is as follows:

WEDNESDAY AFTERNOON

Women in Industry—Replacing Men

Purpose of the Conference, I. A. Berndt, secretary Society of Industrial Engineers.

Labor During and After War, Harrington Emerson, president, The Emerson Co.

Some Things Women Have Done and are Doing to Help Win the War, Mrs. J. T. Bowen, chairman women's committee, Illinois council of national defense.

Women as Munition Workers, J. E. Otterson, first vice president, Winchester Repeating Arms Co.

WEDNESDAY EVENING

Conclusions 1000 Questionnaires of Women in Industry, C. E. Knoeppel, counsel on organization, New York City.

Some Things Women Should do to Help Win the War, Miss Florence King, president, Women's Association of Commerce.

Women in Industry—Replacing Men, Barton T. Bean, president, Klink, Bean & Co., San Francisco.

Replacement of Men by Women in Industry, Richard A. Feiss, general manager, Joseph & Feiss Co., Cleveland.

THURSDAY MORNING

THURSDAY

Round Table Conference—Women in Industry, W. S. McArthur, Armour & Co., Chicago.

Mechanical Equipment—Its Function in Replacing Men

Planning, scheduling and Dispatching, W. S. Ford, manager efficiency division, Montgomery, Ward & Co.

Mechanical Aids to Man, A. Russell Bond, managing editor, Scientific American.

Standardization of Machines and Tools, Ellis F. Muther, general sales manager, Gisholt Machine Co.

THURSDAY EVENING

Relation of Coal Conservation Movement to the Engineer, Joseph H. Harrington, fuel conservation committee of Illinois.

Men Remaining—Securing Their Maximum Production

Maximum Production from Undrafted Labor, Irving A. Berndt, manager betterment department, Jos. T. Ryerson & Sons.

Man Power Engineering, Miss Frances A. Kellor, national Americanization committee, New York.

Scientific Management a Necessity of Modern Organization, F. M. Simons Jr., chairman of directors of Western Efficiency society.

Shifting of New Man-Power to Emergency Production, James O. Craig, president, Business Men's Clearing House.

FRIDAY MORNING

Round Table Conference, Capt. Harry F. Porter, Quartermaster's Corps, U. S. R.

FRIDAY AFTERNOON

Industrial Stimulation Through War Finance, James A. Davis, speakers' bureau, war savings committee.

Re-education of Crippled and Disabled Men, Douglas C. McMurtrie, director Red Cross institute, New York.

Business After the War, Willard E. Hotchkiss, director business education, University of Minnesota.

Mending Fragments from France in Canada, Norman A. Hill, general manager, Carriage Factories, Ltd., Toronto.

FRIDAY EVENING

Banquet, Samuel Insull, chairman, chairman Illinois council of defense.

Human Conservation and Reclaiming of the Disabled, Major Harry E. Mock, surgeon general's department.

Demobilization of Our Armies and Their Reassimilation in Civil Life, Col. J. S. Dennis, British-Canadian recruiting mission.

First Steps in Solution of Crippled Soldier Problem, Maj. F. B. Gilbreth, Providence, R. I.

Pennsylvania Plan for Meeting After-War Conditions, Lew R. Palmer, Pennsylvania department labor and industry.

Labor Checks Iron Output

British Furnaces Unable to Produce at Full Capacity Despite Urgent Demand—American Semifinished Steel is Sought

Bureau of The Iron Trade Review,
Prince's Chambers, Corporation St.,
Birmingham, Eng., March 7, 1918.

GREAT pressure for all kinds of pig iron continues. Every blast furnace in the Midland district could dispose of hundreds of tons more per week, if the metal were available. But no blast furnace maintains anything like a prewar average. One of the largest makers in South Staffordshire considers that his reduction in output, although the furnace is blowing continually, is about 400 tons per week. This is accounted for in various ways. The fuel is of lower quality, all sorting at the pits having had to be abandoned; the ore also is inferior; but the most serious falling off is in the human element. The workmen who feed the furnaces are above military age and their assistants are very largely nondescripts engaged before the war in any trade but that of iron. A number of women assist on the pig beds, and in general boring. Yet in these circumstances there is a keen scent by the recruiting authorities after all men eligible for the army. The managers are protesting with all the vigor they can against military withdrawals of men and are threatening that if their staffs are further interfered with the furnaces will have to cease operation. The practice of cutting down all new contracts is strictly adhered to. The basic furnaces are now yielding full output, which is rendering some help to the steel section.

In the Cleveland district the monthly allotments have been made, and business is restricted to a few supplementary orders. In foundry the supply is not equal to requirements, though there is rather more forge iron available. The warrant stock is the same and shipments are decidedly small. In the Barrow district a furnace has been blown in at Carnforth, and there are now 34 in blast in the area between Maryport and Carnforth. Of these, two have been recently commenced, and it is hoped the larger output will relieve the stringency, though it is not likely to meet the full demand, especially for low phosphorus qualities. Generally, however, the outlook is brighter than for some time, especially as one, if not two, furnaces will shortly be started. The increased output has been made possible by the bringing into the ore mines of additional labor from Scotland. In the Welsh district supplies of hematite still are below requirements, but the ore supplies are well maintained.

Advance is Unsatisfactory

Demand is well maintained for all kinds of finished iron. Makers of chains and anchors and material for agricultural implements are all placing orders with the iron mills, while black sheets are in good request, largely for hutments in England and France. To the general surprise, the ministry of munitions has announced an advance of 2s 6d (60c) in the selling price of unmarked bars, raising the maximum from £13 15s ($66) to £13 17s 6d ($66.60) net at makers' works. Probably nothing yet done by the ministry of munitions in connection with the iron trade has caused greater dissatisfaction than this advance, which, it is said, is too trifling to make any material difference to the ironmaster's position. Rumors of this concession were prevalent a week ago, but the trade for the most part was incredulous, in view of the obvious inadequacy of the amount. Its insufficiency is self evident in view of the high price of puddled bars now selling at £12 15s ($61.20) to £13 ($62.40). This leaves a margin of less than £1 ($4.80) for heating and rolling of the puddled bars to finished material. At a rough computation this should cost about £3 ($14.40) so that manufacturers report that they are suffering a substantial loss on a large part of their production. One of the results of the peculiarity of the position is that the Staffordshire mills usually turning out common iron, now are using rather better pig, and selling their product at the marked bar price of £16 ($76.80). The normal difference in peace time between marked bar and unmarked bar is about 30s ($7.20) but at present the gap is extended to £2 2s 6d ($10.20). The result of the strain is a very wide range of prices. While some firms manage to continue to sell at the official maximum, there are a number of prices above this, charged on various pretexts, and frequently voluntarily imposed by the buyer who cares far more about getting his material than the price. It is a remarkable circumstance that puddled bars are not yet controlled whereas the finished material made from these bars is subject to a government maximum.

All the steel mills and foundries are turning out material to their full capacity. In the Glasgow district the works are immensely busy. But the output still is below demand. Latterly, the government has utilized large quantities of shell discard steel, formerly available for general purposes. The news received through The Iron Trade Review cablegram that the American government has now absolute control of export, is welcomed here, as suggesting a possibility of better supplies when the requirements of this country are fully realized. Users of billets and wire rods could do with considerable quantities of American material, especially the wiremakers. For some time past, the Birmingham mills producing wire have been wholly dependent on American wire rods, and the stoppage of supplies has hit them severely. The proprietors of these mills are contemplating an early shut down, if better supplies are not forthcoming. The demand for their products is enormous.

The Welsh steelworks again are in full operation. There is a shortage in the supply of tin bars which is affecting the output of tin plates, and the amount produced as well as the quantities in stock compare rather poorly with the figures of last year. The extravagant prices of tin keep the selling figures of tin plate at a very high level.

More Mills Ordered

The Carnegie Steel Co. has placed an order for five additional mills to be built at its McDonald plant near Youngstown. These mills will be built at the company's Ohio works, where the mills previously erected by the McDonald plant were built. When completed, this plant will contain one 12-inch, two 10-inch and two 8-inch hoop mills; one 18-inch land mill, one 8-inch, one 10-inch and one 14-inch bar mills. The Carnegie company has placed an order with the Hyatt Roller Bearing Co., Harrison, N. J., for complete roller bearing equipment for all of the new mills, thus providing the new mills as well as those previously built, with these bearings. The use of roller bearings has enabled the company, as a result of the reduction in friction, to reduce the size of the motors driving the tables and cooling beds by about 50 per cent from the sides which originally would be required.

The Bettendorf Co., Bettendorf, Iowa, has waived its patent rights to truck sides and underframes during the period the government is in control of railroads.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

COLONEL HENRY P. BOPE, vice president and general manager of sales of the Carnegie Steel Co., has resigned effective April 1. He has been associated with the Carnegie company in different positions for more than 38 years, having joined the sales department of the company in November, 1879. Colonel Bope has resigned to devote his time to personal interests which require his immediate attention. He has been succeeded in the sales organization of the Carnegie Steel Co. by William G. Clyde, who has been assistant general manager of sales in charge of the bar, hoop and band division. Mr. Clyde in turn has been succeeded by Charles L. Wood, who has been his assistant in that division of the sales department.

Lorenzo C. Dilks, who has been president of Milliken Bros., Inc., Staten Island, N. Y., and prior to that time was connected with the Eastern Steel Co., Pottstown, Pa., as general manager of sales, has been made president of the Carolina Shipbuilding Corp., Charleston, S. C., where the main offices of the company will hereafter be located, moving from New York.

W. L. Reid was recently elected vice president and general manager of the Lima Locomotive Works, Inc., Lima, O. After serving his apprenticeship with the Rogers Locomotive & Machine Works, Paterson, N. J., where he was born, he held positions of increasing importance with the Brooks Locomotive Works, the American Locomotive Co., the National Brake & Electric Co., Milwaukee, and before his latest election, was superintendent of the Baldwin Locomotive Works, Eddystone, Pa.

James A. Campbell, president Youngstown Sheet & Tube Co., and L. E. Block, vice president and treasurer Inland Steel Co., Chicago, have been appointed members of the committee on steel and steel products of the American Iron and Steel institute.

Frederick Holbrook has been elected president of the American International Shipbuilding Corp., to succeed D. P. Robinson, resigned. Mr. Holbrook has been vice president of the contracting corporation of Holbrook, Cabot & Rollins, Boston.

Charles H. Hodges was promoted at the annual meeting of the American Radiator Co., Detroit, from the position of second vice president to that of first vice president.

John W. Higgins was elected president of the New England Safety council, at its second annual meeting, held in Boston recently. He is president and treasurer of the Worcester Pressed Steel Co., Worcester, Mass. S. W. Wakeman, general manager of the Fore River and Squantum, Mass., plants of the Bethlehem Shipbuilding Corp., Ltd., was made vice president.

Jeremiah Winn, who for more than 50 years has been manufacturing wheels in Worcester, Mass., has retired from business because of ill health.

C. Oscar Hedstrom has resigned his position as mechanical engineer for the Hendee Mfg. Co., Springfield, Mass.

COL. HENRY P. BOPE
Who Has Resigned as Vice President and General Manager of Sales of the Carnegie Steel Co.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

JOHN LITTLE, M. I. M. E., for 10 years general manager of the Grimethorpe, Eng., works operated by Cammell Laird & Co., London, Sheffield and Birkenhead, Eng., steel manufacturers, shipbuilders and engineers, has retired. He commenced to work for the company 42 years ago at the age of 13 as an office boy, at the Cyclops branch, which then had 1500 workmen and which now employs approximately eight times that many. About 15 years ago Mr. Little directed the building of one of the largest armor plate plants in the world and when he became assistant chief engineer, the works method was changed from the Wilson compound process of armor plates, namely a steel face with an iron backing, to the Krupp process, which is all steel with a hardened face and soft back. At present Mr. Little is president of the Sheffield branch of the British Foundrymen's association and is mentioned as a possible president for that organization.

J. J. Green has been appointed assistant in the structural sales department of the Bethlehem Steel Co., at Philadelphia.

H. G. Uphaus upon his resignation from the Cambria Steel Co., Philadelphia, accepted the position of district sales manager in that city for the Donner Steel Co., Buffalo.

Robert E. Frame was recently elected vice president of the Hutchins Car Roofing Co., with offices at Detroit. He formerly was assistant to the president of the Haskell & Barker Car Co., Michigan City, Ind.

John S. Kennedy has become affiliated with John B. Guernsey & Co., Roanoke, Va., who operate furnaces at Graham and Roanoke, Va. He formerly was with the Oriskany Ore & Iron Corp., Oriskany, Va.

George R. Munschauer, formerly secretary and treasurer of the Niagara Machine & Tool Works, Buffalo, was recently elected president to succeed George A. Lautz. He has been connected with the company for about 20 years and is succeeded as secretary by W. F. Schweigert, who has seen 30 years' service, and by F. E. Munschauer as treasurer, affiliated with the company for the past 10 years.

A. F. Ausman has been made Chicago district manager for the Nagle Corliss Engine Works, Erie, Pa., manufacturer of air compressors, vacuum pumps, engines, etc. His headquarters will be in the Monadnock block. He formerly was vice president of the McMasters-Carr Supply Co., Chicago.

Benjamin S. Rosenberg, who for many years was connected with the Eagle Smelting & Refining Works, Nassau Smelting & Refining Works and Post van der Burg & Co., has been made manager of the New York office of the United Smelting & Aluminum Co., Inc., to succeed C. J. Wolfe.

James Forbes, formerly with the Manitowoc Shipbuilding Co., has been made manager of the Interlake Engineering Co., Cleveland, to succeed Thomas Deegan, who resigned to accept a position with the Ohio Shipbuilding Co. Mr. Forbes will assume his new duties April 1, and until that time Assistant Manager Captain Joseph Wood will be in charge.

William J. Matheson was recently elected president of the National Aniline & Chemical Co., New York, to succeed J. L. Schoellkopf, who declined re-election. Dr. L. C. Jones, a prominent chemist, was chosen third vice president to succeed C. P. Hugo Schoellkopf, retired. The Schoellkopf brothers will continue as directors.

I. E. Edwards has accepted the position of works manager of the Marshall Foundry Co., Blairsville, Pa. He has been chief engineer of the Valley Mound & Iron Co., Sharpsville, Pa., for the past 12 years and officials and fellow-workers of the latter company tendered a reception to him recently upon his resignation. At one time Mr. Edwards was connected with the Carnegie Steel and National Tube companies.

J. V. S. Bishop, Real Estate Trust building, Philadelphia, has been made secretary of the eastern division of the American Board of Scrap Dealers, to succeed C. A. Barnes, Widener building, Philadelphia, who resigned recently. Mr. Barnes will continue as secretary of the national organization and will devote most of his time to the duties of secretary of the new subcommittee on iron and steel scrap of the American Iron and Steel institute.

Richard K. Papin, who formerly was St. Louis and southwestern representative of the Davenport Locomotive Works, Davenport, Iowa, but who for the past 10 years has been manager of the equipment department of the Walter A. Zelnicker Supply Co., St. Louis, dealer in railway equipment, has been transferred to Minneapolis, Minn., to take charge of the recently opened offices of his company in the Plymouth building there.

Victor W. Page, has been promoted to the rank of captain in the signal reserve corps, aviation section, at Hazelhurst field, Mineola, L. I., from the position of engineering officer in full charge of the mechanical and technical departments in the Mineola school for aviation and care and operation of military trucks. Mr. Page was formerly in the engineering department of the New Departure Mfg. Co., Bristol, Conn.

D. P. Thompson, who in 1912 became assistant general superintendent of the Inland Steel Co., Indiana Harbor, Ind., of which his father is president, has been promoted to the position of assistant vice president. He was born in Newcastle, Pa., in 1880, and ever since he was graduated from Yale University. he has followed iron and steel and mining, four years in Alabama and four years in Cleveland.

John B. Emerson, for 10 years in charge of work in the southwest for Robert W. Hunt & Co.'s bureau of inspection and tests, has entered the employ of the La Salle Engineering Co., Old Colony building, Chicago, designing and consulting engineers. The La Salle organization has expanded rapidly in the past few months on account of its new commissions in marine engineering, and it is now occupying the entire fourth floor of the Old Colony building.

P. C. Gunion, who early this year was made advertising manager of the industrial bearings division at Newark, N. J., of the Hyatt Roller Bearing Co.,

Harrison, N. J., has been promoted to the position of advertising manager with headquarters in the Metropolitan building, New York. He succeeded R. A. Holme, who recently resigned to accept a similar position with the Machinery Utilities Co., New York. Mr. Gunion was formerly manager of the Pittsburgh office of the Hyatt company.

Iron and Steel Men in War Machine

J. Leonard Replogle, Steel Director for Government

J. LEONARD REPLOGLE as steel director for the government, probably possesses a greater knowledge of the intimate affairs of the iron and steel industry than any other individual. Weekly there come to his desk complete confidential reports from the country's pig iron producers and steelmakers, which set forth the exact position of these concerns as to orders on hand, deliveries, etc. These reports, coupled with his personal knowledge of the steel business, enable him to keep his finger upon the pulse of the industry, to the end that orders for steel from the United States or allied governments are most expeditiously allocated and handled. From the position of office boy at 13, in the period of 29 years, he has risen through positions of increasing importance and scope, until now at 42, he has been called upon to serve the country in one of the most responsible posts of the war behind the lines. After a service which in point of time extended over more than a quarter century with the Cambria Steel Co., Johnstown, Pa., marked with many promotions, beginning as office boy and ending as vice president and general manager of sales, he resigned in January, 1915, to become vice president and general manager of sales of the American Vanadium Co. In this capacity, he brought about a material enlargement of the market for vanadium steel. He was elected to the presidency early in 1917 and in March of that year organized and became director and board chairman of the Wharton Steel Co., Wharton, N. J. His resignation from those connections, because of the character of his present Washington duties took place recently. In August, 1917, he was made steel advisor to the government to direct the purchase of steel for war purposes, with headquarters in the Munsey building, Washington. Three months later, he was chosen by the war industries board as steel director under responsibility to that body for the proper allocation among producers of orders from the United States and allied governments. His executive training and complete familiarity with the ramifications of the industry qualify him peculiarly for his duties.

J. LEONARD REPLOGLE

Enlarge Transport Line to Europe

Taking Over of Dutch Merchant Fleet and Further Restriction of Imports Will Provide More Than 1,000,000 Tons of Additional Shipping—Must Rely on Domestic Sources of Metals and Ores

WASHINGTON, March 26.—Almost simultantously with the commencement last week of the long-expected spring drive of the Germans came action by the United States and the allies which is to provide for speedier transport of munitions, food and men from the industrial constructive line in America to the military destructive line in Europe. This action was really double, the combination adding more than 1,000,000 estimated tons of available ocean shipping to the steady stream essential to supplying the allied fighting forces in France.

One part of the double action was a concerted move by the United States and Great Britain in commandeering more than 800,000 tons of vessels flying the flag of Holland but lying idle in American and British ports. The other was the blow struck at import shipments through the promulgation of the war trade board's first list of restricted imports. This latter action is expected to place more than 300,000 tons of ships in actual war service, curtailing an aggregate of over 1,000,000 tons of imports normally received by the United States. Fully three-fifths of this aggregate is represented in metal shipments.

To Clear Up Accumulations

The addition of the Dutch tonnage, approximately 70 ships, now being overhauled under supervision of the navy and the shipping board, is expected to shortly expedite shipments of steel projectiles, cannon, machinery and other munitions which have been filling tidewater terminals and waiting ocean tonnage. The removal of these supplies, as well as the large quantities of foodstuffs, is seen here as one of the means of increasing production, providing the railroads will be able to haul the manufactured products to seaboard as fast as ports are cleared.

Manufacturers who have been depending upon foreign metals and ores, particularly nickel, pyrites and zinc, for their raw materials, now will have to look to domestic production to supply their requirements. Nickel and zinc are absolutely cut off through the embargo, but 125,000 gross tons of pyrites may be imported before Oct. 1. From this limited quantity and after that date domestic fields will have to supply the manufacturers with the sulphur and sulphuric acid now produced from imported pyrites. For some time past the department of the interior has been campaigning for exploitation of this work here in the United States.

Imports Further Restricted

The action of the war trade board in declaring a list of restricted imports was not made to allow free importation of commodities not on the list. In fact, it was stated by the board, the same rigid licensing system is to be maintained, more rigid than ever, if there is to be any change at all. This is precluded by the fact that the list announced was called "No. 1", indicating at least another is to come, possibly more. To what extent shipping still could be conserved by further lists has not been attempted in a public estimate, but the war trade board, spurred on by the shipping board, is ready to go as far as compatible with expanding the embargo list. It is altogether likely the list will not be shortened until the ships now being built begin to make the ocean splash with a great many more launchings.

The curtailment of imports is regarded as the logical completion of the argument that it is absurd to gear American industries to top speed for production of war supplies which only pile up in warehouses and terminals and cannot be put to use because there isn't sufficient ships to move even those requirements actually needed. Stopping of shipments of imported raw materials is expected to curtail some less essential production. That will tend to lead those manufacturers to enter more essential fields which again would lead to overproduction. But, government officials feel, curtailing really essential imports such as zinc, nickel and pyrites will even things up a bit.

List Covers Wide Range

The list promulgated by the war trade board includes the following which are associated with the iron, steel and allied industries:

Agricultural implements; asbestos; cars, carriages and other vehicles; all acids; muriate of ammonia; all coal tar distillates except synthetic indigo; clocks, watches and parts thereof; electric lamps; explosives, except fulminates and gunpowder; fish hooks, rods and reels, artificial bait; fluorspar; gold and silver manufactures, including jewelry; musical instruments and parts thereof; nickel; penholders and pens; phonographs, gramophones, graphophones and parts thereof; plates, electrotype, stereotype and lithographic, engraved; plumbago or graphite (until July 1, 1918; thereafter not exceeding 5000 long tons for remainder of 1918); pyrites (except not exceeding 125,000 long tons to Oct. 1, 1918); tar and pitch of wood; umbrellas, parasols, sunshades and sticks for; and zinc.

McAdoo Must Ratify All Railroad Buying

WASHINGTON, March 26.—Practically every bit of steel required for future railroad construction, whether it be for road repair or extension or for new equipment, will have to wait upon Director General McAdoo's approval of the sum to be expended. This is in accordance with an order Director McAdoo issued almost before the ink had dried in the President's signature to the railroad bill last week. This move is regarded as one of the many the director general in his senior capacity as secretary of the treasury has made to subserve all new financing to the government's war requirements.

The new order says no new locomotives or cars shall be ordered or constructed without Mr. McAdoo's approval, and that no new construction of lines or extension of present lines are to be undertaken without his sanction. Work contracted for and ordered before Jan. 1, 1918, may continue, Mr. McAdoo says, but even

then he asks that the railroads make sure the work is essential. He asks that all work conform to these conditions:

From the financial standpoint it is highly important to avoid the necessity for raising any new capital which is not absolutely necessary for the protection and development of the required transportation facilities to meet the present and prospective needs of the country's business under war conditions. From the standpoint of the available supply of labor and material, it is likewise highly important that this supply shall not be absorbed except for the necessary purposes mentioned.

"Please also bear in mind that it may frequently happen that projects which might be regarded as highly meritorious and necessary when viewed from the separate standpoint of a particular company, may not be equally meritorious or necessary under existing conditions, when the government has possession and control of the railroads generally, and therefore when the facilities heretofore subject to the exclusive control of the separate companies are now available for common use, whenever such common use will promote the movement of traffic."

The railroad administration will not stand in the way of any other work which does not involve expenditure of more than $25,000, providing the proposal conforms to the policy of the administration relative to finances, labor, materials and its importance to railroads in the war; also providing it conforms to a policy of the railroad in effect in 1916 and 1917; and still further providing full reports are made to the administration within 10 days of the commencement of work or the placing of contract. If the expenditure is to be greater than $25,000, it still must conform to the administration's policy and have Mr. McAdoo's approval.

Judge Robert S. Lovett, who had been made director of the division of betterments and additions, has been made director of the division of capital expenditures in charge of this particular phase of railroad financing. Reports and applications must be made to Director Lovett, who will confer with the director general for his approval, if it is required, and then refer the question to John Skelton Williams, director of the division of finance and purchases, for execution.

Plants to Get Coal from Nearest Mines

WASHINGTON, March 26.—The national fuel administration's coal zoning plan becomes effective next Monday by which mills and furnaces of the iron and steel industry will obtain their supply of bituminous coal from the nearest mines. This is the theoretical object of the plan which affects more than 300,000,000 tons of soft coal annually for an estimated saving of more than 160,000,000 car miles, enabling the car equivalents thus saved to tend to increase coal production fully 5 per cent. The resultant elimination of cross hauls will also have the benefit, it is expected, of reducing the possibility of coal car congestion.

The new plan will not apply to anthracite coal, coke or bituminous coal intended for by-product ovens, gas, metallurgical, smithing or other specific uses where special grades of fuel are required. To obtain the benefits of these exemptions, for bituminous coal, manufacturers and consumers of this special coal must obtain from the fuel administration special permits. Applications should be sent to the United States Fuel Administration, Coal Zone License Bureau, Room 6209, New Interior building, Washington, D. C., with complete information in order that the licensing may be expedited.

How Zones Are Fixed

Pennsylvania, Maryland and northern West Virginia will ship to West Virginia, Maryland, District of Columbia, Delaware, Pennsylvania, New Jersey, New York, New England and Lake Erie ports, for transshipment only, except that Pennsylvania may ship as far west as Wellington and Lorain, O.

Ohio will ship to Ohio, Indiana and Michigan.

West Virginia high volatile fields will ship to West Virginia, Ohio, Indiana, the lower peninsula of Michigan, Kentucky and Virginia.

West Virginia low volatile fields will ship to District of Columbia, North Carolina, Virginia, Kentucky, Ohio, West Virginia, South Carolina and Lake Erie reports for transshipment only.

Alabama will supply Louisiana, Mississippi, Alabama, Georgia, Florida, eastern Texas, Arkansas and western Tennessee.

Tennessee, Georgia, Kentucky and Virginia will ship to North and South Carolina, Georgia, Tennessee, Alabama, Virginia and Florida.

Virginia, southeastern Kentucky and Tennessee will supply Kentucky, Indiana, Ohio and the lower peninsula of Michigan.

Western Kentucky will ship to Kentucky, Tennessee, Mississippi, Arkansas, Louisiana, Texas, Illinois, Wisconsin and Indiana.

Indiana will ship to Illinois, Kentucky, Wisconsin and Michigan.

Illinois will supply, from April 1 to Sept. 30, Illinois, Wisconsin, Minnesota, South Dakota, Iowa, Missouri, Arkansas, Louisiana, Tennessee, Kentucky, Indiana and Michigan, and from Oct. 1 to March 31, Wisconsin, Missouri, Arkansas, Louisiana, Tennessee, Kentucky, Illinois, Indiana and Michigan.

Missouri, Arkansas, Kansas, Oklahoma and Iowa will ship to western Louisiana, eastern Texas, Missouri, Kansas, Arkansas, Iowa and Oklahoma.

Montana, Wyoming, Colorado, New Mexico, Utah, Washington and Oregon will supply the Rocky Mountain and Pacific Coast states, except that the mines east of the Rockies may ship also to Missouri valley points to supply the summer demand.

Lake Michigan and Lake Superior docks will supply the Dakotas, Minnesota, the upper peninsula of Michigan, northern Iowa and Wisconsin.

Huge Sum Goes to Mobile Artillery Production

Washington, March 26.—The gun division of the army ordnance bureau is spending $40,000,000 in the construction of 16 factories for the manufacture of thousands of mobile artillery pieces and in the course of another year will have paid out $300,000,000 for this particular type of weapon, according to a statement by the war department. The division's program calls for an expenditure of approximately $2,000,000,000.

While this vast sum will be used partly in building and equipping plants for the manufacture of guns, the larger part of the undertaking will be spent for other work falling to the administration of the division. This includes the nitrate fixation, smokeless powder, gas filling, acids and other developments, according to the statement.

The plants and additions contemplated under the program, especially

those devoted to manufacturing the artillery, are all under construction and some have been completed. Department officials decline to discuss details of the artillery factory work, but the statement says "forgings are already being produced and the machining plants are in an excellent state of progress".

The gun division's construction program, in addition, includes two smokeless powder plants, one nitrogen fixation plant, one gas-filling plant, to cost approximately $1,500,000; five shell-filling plants to cost approximately $25,000,000; and negotiations with cities for erection of by-product plants for extraction of toluol.

Increase Export Check on Sweden and Greece

Washington, March 26.—New and stricter regulations controlling exports from the United States to Sweden and Greece have been issued by the war trade board. Before an exporter may make applications for license he first must obtain from the prospective importer the number of the Swedish import certificate; use form X; such other supplemental forms as may be necessary; an additional supplemental sheet, form X-104 giving the gross weight of the proposed shipment and any instructions relative to cables to Sweden, which will be sent at his own expense in order to hasten the war trade board's investigation in lieu of mail inquiries abroad; and observe fully the instructions formerly given concerning shippers' export declarations. Shipments should go forward in Swedish bottoms. The import license serial number is not needed on shipments to Greece, nor is it necessary to ship by way of Greek vessels. Supplemental sheet X-101 is to be used in the case of each shipment made.

Capital Odds and Ends

WASHINGTON, March 26.—Denial was made last week by Theodore E. Ferris, who was formerly chief ship designer for the Emergency Fleet corporation that he received compensation of any kind in connection with any contract secured from the corporation and that he was in no way interested in the Sloan Shipbuilding Corp. Mr. Ferris resigned when the senate investigation committee was at the height of its probe and when it was charged that he had received a fee from the Sloan corporation. He told the committee last week that he had an understanding with the corporation before the incumbency of Admiral Bowles, who requested his resignation, that he could continue what private practice he had providing it did not interfere with government work. Mr. Ferris appeared before the committee upon his own request.

* * *

The Great Northern railroad desires an increase from $7 to $7.30 per net ton in carload commodity rate on zinc and concentrates from Butte, Helena and other points in Montana to Keokuk, Iowa.

* * *

Nonapplication of rates is asked on in and terne plate via Chesley Tug & Barge Co., Kingston Transportation Co., Lillico Transportation Co., Mainland Navigation Co. and Star Steamship Co., to various points in Washington and British Columbia.

* * *

The Emergency Fleet corporation has spent $392,000,000 up to March 1 in its shipbuilding program. There remains to be spent the difference between that amount and $2,000,000,000 which the program contemplates and which congress has authorized.

* * *

An increase of $5,000,000 each month has been noted in the post office revenue figures since the new war postal rates went into effect last November. Estimates based on 1917 post office business indicate that the gain for the year under the increased rates will be approximately $75,000,000.

* * *

The amount of tin imported to the United States last year from Singapore and Penang, Straits Settlements, decreased nearly 2,000,000 pounds in volume and more than $2,000,000 in value from the corresponding totals of 1916. The total value of the 1917 import was $23,909,000 as against $26,124,000 in 1916.

* * *

The council of national defense, parent body of the highways transport committee, has passed a resolution approving its efforts to increase the use of motor trucks in solving transportation problems and requesting state organizations to provide for further use of trucks and to eliminate any restrictions which discourage this use.

* * *

The Emergency Fleet corporation is now working on designs for 10 ships of 15,000 tons each, the largest vessels to be used in the American merchant marine. The shipping board has approved the general idea and has put the matter up to the corporation to be worked out. These ships will be of steel, of the nonsinkable type and likely will be awarded to some of the older ship yards of the country.

* * *

The National Steel Rail Co. has complained to the interstate commerce commission for reparation of $1542 on a shipment of 274 tons of rails and 37 tons of track material from New Madrid, Mo., to the Laclede Steel Co., Madison, Ill. The National company claims the published rate of 31 cents per 100 pounds exceeds a rate of $2 per ton allowed in other tariffs, and is unjust.

* * *

On complaint of the Durham Coal & Iron Co., Durham, Ga., the interstate commerce commission has found a rate of $5.85 applicable on blacksmith coal in carloads from Durham to Denison, Tex., unreasonable as it exceeds the lowest combination of intermediate rates in effect over the route. Reparation of $17.44 has been awarded. Shipment was made over the Central of Georgia and other railroads.

* * *

While the order of Jan. 9 limiting the consumption of fuel by manufacturers of box board, paper board, straw board, etc., is temporarily suspended, the fuel administration, through the federal trade commission, is making a survey of the production and consumption of all paper and pulp products in order that these related industries may be limited in similar capacities when the order is again put into effect.

* * *

An agreement has been made between coal operators of West Virginia and J. D. A. Morrow, manager of distribution for the fuel administration that Pocahontas, or smokeless soft coal, the fuel coal mostly used by manufacturers in Chicago, Detroit, Indianapolis, Dayton and other middle western cities, may be used during the coming summer by steamships passing through the war zones. This plan involves consumption of 5,000,000 tons of the coal.

Lets Refining House

The Cleveland-Cliffs Iron Co. has let a contract to the Arnold Co., Chicago, to erect a new refining house at the North Marquette furnace, Marquette, Mich., to replace that destroyed in the recent explosion and fire. The new building will be fireproof, of steel, concrete and glass. Since the explosion only a small portion of the by-product recovery has been possible. Several months probably will be necessary to restore full operation of the chemical plant. The company also has let a contract for a sawing and splitting mill at its furnace at Kipling, Mich. This is under the same management as the Marquette plant. Due to scarcity of labor in the woods the logs will be shipped direct to the mill and there prepared for the retorts.

Government Furnishes Shipwrights

Eastern Yards Asked to Fill Labor Requirements from Public Service Reserve—Classification of the 200,000 Enrolled Commences—Wage Scale Decided for Delaware River and Baltimore Districts

NOTIFICATION has been sent to all shipyards east of the Rocky mountains that the United States employment service of the department of labor now is prepared to fill all their labor requirements. Since the recent drive for 250,000 shipyard workers resulted in the registering of 200,000 mechanics, all yards are asked to obtain workers exclusively from this public service reserve. Government officials state that if shipyard operators will comply with this request, it will mean the elimination of the confusion to industry resulting from competitive bidding for labor and the attracting of large bodies of labor from one section to another. Directors of the United States public service reserve in each state have been notified to begin the classification of volunteers already enrolled so they may handle expeditiously any orders for workmen that may be placed. They likewise have been requested to continue registering volunteers, since some states have not filled their quotas.

That considerable progress has been made in reducing labor discontent in shipyards to a minimum is the hope of officials of the labor department, with the putting into operation of a wage scale in the Delaware river and Baltimore districts. This scale calls for an 8-hour day from Monday to Friday, with four hours on Saturday; time and a half for overtime; maximum week is 60 hours except in emergency cases in drydocks; night workmen are paid 5 per cent over the scale. This applies to the yards of the American International Shipbuilding Corp., Hog Island, Pa.; New Jersey and Pennsylvania Shipbuilding companies at Gloucester, Pa.; New York Shipbuilding Co., Camden, N. J.; William Cramp & Sons Ship & Engine Building Co., Philadelphia; Bethlehem Shipbuilding Corp., Sparrows Point, Md.; Baltimore Dry Dock & Shipbuilding Co., Baltimore, and others.

The wage scale in cents per hour is as follows:

Acetylene department, burners (first class) 65, (second class) 60; grinders and chippers 50, welders 65, helpers 46.

Anglesmith department, anglesmiths (heavy fires) 87½, helpers 55, (other fires) 72½, helpers 46, furnacemen on shapes and plates (shipwork) 82½, electric welder 65.

Blacksmith shop, hammer and machine forgers (heavy) $1.35, heaters and heavy hammer runners 55, levermen or crane men 70, helpers 50, blacksmiths (heavy fires) 87½, helpers 55, (other fires) 72½, helpers 46, drop forgers 70, helpers 50, bolmakers 72½, helpers 46, laborers 40, liner forgers 55, helpers 46.

Boiler shop, boilermakers 70, drillers 60, holders-on 50, rivet heaters 40, flange burners and slab furnace men 75, helpers 46, planer hands, 55.

Bolting and liner department, bolters 50, linermen 54, helpers 42½.

Cement department, cementers 50, helpers 42½.

Chipping and calking department, tank testers, hand chippers and calkers 70, pneumatic chippers and calkers 65, packers 50.

Cleaning department, leader 55, laborers 40.

Coppersmith department, coppersmiths 70, helpers 46.

Drilling and reaming department, drillers 60, reamers 50.

Electrical department, electricians (first class) 70, (second class) 65, wiremen 55, joiners 70, machinists (first class) 72½, helpers 46.

Erecting department, leading men 85, marine erectors (first class including machinists, plumbers and pipe fitters) 72½, (second class) 62½, specialist or handy man 52, helpers 46.

Fitting-up department, fitters (first class) 72½, (second class) 65, regulators (first class) 60, (second class) 52½, helpers 46.

Foundry department, molders, coremakers, cupola tenders, 72½, helpers 46, hand and machine chippers 50, laborers 40.

Furnace department, leaders 67½, firemen and helpers, strikers 55.

Hull engineering department, marine erectors (first class including machinists, plumbers and pipe fitters) 72½, (second class) 62½, specialists or handy men 52, joiners 70, helpers 46.

Joiner department, joiners, machine men 70, helpers 42½.

Lumber department, machine men 65, helpers 42½.

Machine shop, machinists (first class) 72½, (second class) 62½, specialists or handy men 52, helpers 46.

Material labor department, engineers (locomotive) 65, operators (locomotive, cantilever, gantry and other cranes of over 3 tons) 70, operators (stiff-legged derricks) 68, hoisting and portable firemen, locomotive and road crane conductors 50.

Mold loft, gang leaders 85, loftsmen (first class) 82½, (second class) 72½, joiners 70, helpers 42½.

Paint department, painters and polishers 60, helpers 42½.

Pattern shop, patternmakers 75, laborers 40.

Rigging department, marine and crane leaders 75, marine riggers 62½, crane gang leaders 67½, cranemen and erector leaders 60, erectors 50.

Riveting department, rivet testers, hand riveters 70, stage builders 57½, pneumatic riveters 65, holders-on 50, heater boys 38, passer boys 30, helpers 46.

Ship carpenter department, ship carpenters (first class) 70, (second class) 65, fasteners 60, erectors 50, helpers 42½, wood calkers 70, wood reamers 55.

Ship shed department, punchers, planers, scarfers, countersinkers 55, drillers 60, bending rollers 62½, mangle rollers 57½, pressmen (first class) 62½, (second class) 55, offsetters 55, sawyers 47½, helpers 46.

Ventilation department, layers out and sheet metal workers 70, helpers 46.

The rates for the employes engaged in construction work are as follows: Operators (locomotive cranes) 82½, blacksmiths, molders, plumbers, pipe fitters 72½, sheet metal workers, carpenters 70, electricians (first class) 70, (second class) 65, wiremen 55, engineers 65, painters 60, common laborers 35.

Scales for shipyards in other localities will in all probability be decided upon as soon as sufficient data is secured regarding local conditions.

An interesting compilation of shipyard workers has been made by the Emergency Fleet corporation, which shows that while only 44,962 workmen were employed in shipyards in 1916, 43,582 in steel yards and 1382 in wooden, by Jan. 1, 1918, the total had swelled to 204,710, comprising 181,273 and 23,437 workmen in steel and wooden shipyards respectively. This number with the new shipyard army recently enrolled will mean approximately 450,000 men at work on ships when the yards are in full swing.

Obituaries

SAMUEL LLOYD, who for many years was associated with Lloyds, Foster & Co., Wednesbury, Eng., died at Farm, Sparkbrook, Birmingham, recently at the age of 90. With John Brown, of Sheffield, he was the first to adopt the bessemer and siemens processes in England. He was the founder of the tube manufacturing firm of Lloyd & Lloyd, which amalgamated 15 years ago with the Glasgow firm now trading under the style of Stewarts & Lloyds, Ltd. He was one of the original members of the Iron and Steel institute, joining in 1869.

Daniel J. Carroll, aged 55, office manager for the Henry Vogt Machine Co., Louisville, Ky., died in that city recently, following an illness of several weeks.

Charles H. Stone, prominent merchant and business man of Kenne, N. H,. died there recently at the age of 79. He was an exdirector of the New England Hardware Dealers' association.

Harry E. Eury, after serving the Henry Vogt Machine Co., Louisville, Ky., for over 15 years, latterly as sales manager of the boiler department, died at his home there, aged 47, after an illness of two days.

Willard J. Nixon, secretary and treasurer of the Wright-Martin Aircraft Corp, Elizabeth, N. J., died Feb. 23 at his home in Orange, N. J. of pneumonia. Mr. Nixon was 61 years of age.

Edward T. Burrowes, who retired from the screen manufacturing business six years ago, having been a pioneer in it, died in Portland, Me., recently. He was born in Sherbrooke, Que., in 1852.

Homer Thayer Lovell, aged 76 years, died at his home in Chicago, March 9, following a paralytic stroke. For many years, he was salesman for the Crane Co., and then became connected with the Western Valve Co. He retired from active business life about 10 years ago.

Harry V. Brady, prominent in Framingham, Mass., manufacturing interests and superintendent and treasurer of the International Engineering Works of that city, died in a Boston hospital recently after a brief illness, aged 42.

George S. Richardson, who for 46 years has been general superintendent of the Fitchburg Machine Works, Fitchburg, Mass., died at his home there after a brief illness of pneumonia, aged 64. He was born in Wheelock, Vt., and located in Fitchburgh 47 years ago.

Captain William Penglase, who for many years was mining captain for the Jackson Iron Co., and since 1905 captain of the Cleveland-Cliffs Iron Co.'s Jackson mines, died recently at his home in Negaunee, Mich. He was a mining expert of the upper peninsula of Michigan.

Joseph Grandidier, who was prominent in the National Amalgamated Association of Iron, Steel and Tin Workers, died recently in New Albany, Ky., at the age of 59. He had held positions at the plant of the Ohio Falls Iron Co., and as foreman of the St. Louis Bolt, Nut & Screw Works.

Frank L. Underwood, president of the British Columbia Copper Co., died in the Post-Graduate hospital, New York City, recently. He was first president of the Arizona Copper Co., and one of the promoters of the American Smelting & Refining Co. He was born in Waldon, Vt., 74 years ago.

Clifford S. Barbour, who was born in Portland, Me., 74 years ago, died recently in Bath, Me., following a minor operation. He was a skilled machinist at the Bath Iron Works in that city and in 1882 took a locomotive across country from Portland, Me., to Portland, Oreg., via San Francisco.

Hezekiah Scritchfield, who was one of the junior partners of the Carnegie Steel Co., having been made head of the heating furnaces at the bloom mills of the Edgar Thompson Steel Works, Braddock, Pa., in 1875, and subsequently superintendent until 1910, died at his home in Hawkins Station, Pa., from heart failure. He was born in Bedford county, Pa., Oct. 10, 1844, and after service in the civil war he was employed by the Cambria Iron Co. He was one of the first beneficiaries of the Carnegie junior partner fund.

Henry Sabin Chase, president of the Chase Companies, Inc., which includes the Chase Rolling Mill Co., the Waterbury Mfg. Co., Waterbury, Conn., and the Chase Metal Works, Waterville, died in that city recently, following an operation for appendicitis. He was born in Waterbury 63 years ago and was graduated with the class of 1877 from Yale university. His life's rule was "to pursue legitimate objects in legitimate ways, hard, patient work, square and truthful dealings, and concentration of mind and purpose." He was identified with many other financial and industrial enterprises.

James Drummond McGregor, vice president of the Nova Scotia Steel & Coal Co., New Glasgow, N. S., and one of its incorporators, died in New Glasgow recently at the age of 80. He was the oldest surviving director of the Nova Scotia Steel & Coal Co., and had extensive mercantile and shipowning interests. He took an active interest in political affairs and after serving a term in the provincial legislature was nominated to the Canadian senate in 1903. In 1910, he was appointed lieutenant-governor of Nova Scotia. He likewise was prominent in religoius and philanthropic work.

Colonel Edwin A. Stevens, born March 14, 1858, in Philadelphia, died recently in Providence hospital, Washington, where he was serving as shipyard inspector. He was graduated from Princeton University in 1879 with an A. B. degree and took a course in Stevens Institute of Technology, founded by his father, graduating as an engineer. He designed the first screw propeller ferryboat, the BERGEN, which still operates between Hoboken and New York. As a marine engineer he was vice president of the American Society of Mechanical Engineers and held that office in the Society of Naval Architects and Marine Engineers.

Harry B. Barren, blast furnace superintendent for the Inland Steel Co., Indiana Harbor, Ill., died recently at his home there following a sudden attack of pneumonia. He was graduated from Case School of Applied Science, Cleveland, in 1910, and became gas chemist and efficiency engineer with the National Tube Co., Lorain, O. Later he was appointed assistant superintendent of blast furnaces for the Inland Steel Co., and subsequently was promoted. Mr. Barren was the son of Henry A. Barren, general superintendent of the Pittsburgh, Donora and Cleveland districts for the American Steel & Wire Co.

Price Regulation

Is Not Expected by the Producers of Refractories

Producers of refractories did not from the outset believe that the government proposed to fix prices for their products and they now understand that it will not be done. They say present prices are now under levels that are justified in view of the high costs of raw materials they use with prospects of additional expenses of production. It also is pointed out that prices have not been increased since the United States went to war. Conditions of the industry have caused loss of production and therefore heavy overhead costs have resulted. This is due to a shortage of cars and railroad embargoes. Extreme difficulty is being experienced in obtaining shipments of lime and sand and of making shipments from their plants.

Makers are considerably behind in deliveries and can take but little new business. Demand continues to be active. At the annual meeting in Chicago on March 7-8 of the Refractories Manufacturers' association, all the officers were re-elected as follows: President Porter S. Kier, the Kier Fire Brick Co., Pittsburgh; Vice President E. M. Allen, American Refractories Co., Chicago; Treasurer J. H. Cavender, Chicago Retort & Fire Brick Co.; Secretary Frederic W. Donahoe. The association will continue its association with the Mellon institute.

Demand for refractories in northern Ohio meets with only partial satisfaction, as the car situation still continues acute, even for those plants working on government orders. During the early part of the month it was reported that some plants were receiving only 10 per cent of their required number of cars. At the present time it is reported that about 30 per cent of the cars asked for are set. This is an improvement, but small in view of the fact that orders for refractories have been accumulating during the entire car shortage. Those concerns having a stated consumption have ordered repeatedly, but have been obliged to draw continuously on their reserves. The price consideration does not enter into the question of refractories at the present time.

Refractories

(Per 1000 f. o. b. works)

FIRE CLAY BRICK.

(First Quality)

Pennsylvania	$45.00 to 55.00
Missouri-Illinois	55.00 to 65.00
Ohio	45.00 to 50.00
Kentucky	45.00 to 55.00
New England	55.00 to 65.00

FIRE CLAY BRICK

(Second Quality)

Pennsylvania	$40.00 to 50.00
Ohio	35.00
New England	48.00 to 58.00

SILICA BRICK.

Pennsylvania	$50.00 to 60.00
Chicago	55.50 to 65.50
Birmingham	45.00 to 55.00

MAGNESIA BRICK

(Per Net Ton)

9 x 4½ x 2½	$135.00 to 160.00

CHROME BRICK

(Per Net Ton)

9 x 4½ x 2½	$135.00 to 140.00

BAUXITE BRICK

(Per Net Ton)

55 per cent	$40.00 base
76 per cent	100.00 base

Opens Branch Office

To continue its policy of expanding and increasing the field of its activity when necessary to meet demands, the Latshaw Steel & Metal Products Corp., New York City, recently opened a branch office in Chicago in the Railway Exchange building. Marvin White Singer, who was graduated from Lehigh University as a mechanical engineer and who has been affiliated with the Bethlehem Steel Co., the Pennsylvania Railroad Co., and the Pullman Co., has been placed in charge. The Latshaw company contemplates opening other branch offices at Pittsburgh, Philadelphia, etc., in the near future.

Building New Plant

The Peerless Foundry Co., of which C. Howard Hook is president, has begun the erection of a plant at Latrobe, Pa. The first building will cover 80 x 375 feet and will be equipped to produce a full line of low pressure gas and coal cast iron boilers. The company is expected to begin operation shortly after July 15. All of the machinery for the plant has been purchased and after it has been completed the company will have a first class equipped foundry and machine shop. The general office of the company is located at Pittsburgh.

Start Coke Plant

Approximately 500 tons of coal are being coked each day, producing 3,000,000 cubic feet of gas along with the usual by-products at the plant of the Chattanooga Coke & Gas Co., Chattanooga, Tenn., since 24 new Semet-Solvay ovens have been placed in operation. About 5000 gallons of coal tar are produced daily and 150 tons of ammonium sulphate monthly.

Strong Demand

Suddenly Develops in Solvent Naphtha—Toluol Supply More Adequate

New York, March 23.—The work of the committee of the war industries board in co-ordinating the toluol requirements has reached a stage where it is regarded as assured that supplies may be set aside soon for ordinary commercial uses. Producers figure that by July there will be enough toluol to go around. These optimistic views are due largely to the increasing output resulting from improved traffic conditions. Demand for benzol generally has broadened. Pure benzol is quoted at 35 to 40 cents per gallon. This level may be shaded on large orders.

The most surprising development in the coal tar products market is the greatly improved demand for solvent naphtha. Up to a couple of months ago purchasers were few and prices sagged. Large sales now have been made and demand is further increasing while stocks have been reduced to a minimum. The largest producers are not quoting. The market continues largely nominal, at 18 to 22 cents per gallon.

Business in phenol comprises occasional spot lots at 53 to 55 cents per pound. Producers continue to refuse to quote on contract requirements. Both the United States and French governments would place orders for 500,000 to 750,000 pounds per month, were additional quantities to be had.

Consumers of sulphate of ammonia are showing considerable interest in their requirements over the coming year. They would like to place contracts which will assure them of their pro rata share of the surplus after the government's needs are supplied.

Coke Oven By-Products

Spot

Per Gallon at Producers Plant	
Pure benzol	$0.35 to .40
Toluol	(nominal)
Solvent naphtha	.18 to .22
Per Pound at Producers Plant	
Phenol	$0.52 to .55
Naphthalin	.10 to .12
Per 100 Pounds at Seaboard	
Sulphate of ammonia (nominal)	$5.40 to 5.50

Contract

Per Gallon at Producers Plant	
Pure benzol	$0.35 to .40
Toluol	nominal
Solvent naphtha	.18 to .22
Per Pound at Producers Plant	
Phenol nominal.	
Per 100 Pounds at Seaboard	
Sulphate of ammonia	nominal

Dividing Steel in Great Britain

Country is Split Up Into Six Producing and Consuming Districts in Charge of Superintendents Who Arrange Rollings of Mills in That Territory—Light Plates Are Standardized

OWING to the confusion and the lack of exact knowledge which has seemed to surround the British method of distributing steel supplies, the ministry of munitions has published recently a detailed explanation of the form and operations of the system. Because the demand for steel is far in excess of the possible supply, and in order to insure the delivery of available material as early as possible, it has been made necessary the ministry points out, to organize a system of control over mill rollings.

The country has been divided into six areas, each of which has been placed in charge of a steel superintendent who represents the admiralty and the ministry of munitions. One of his chief functions is to advise and assist industries located in his area to obtain the steel needed by them for authorized purposes. The industries requiring supplies must consult with him and follow his directions. The six areas with their steel superintendents follow: Scotch, G. P. West; North-East Coast, H. J. Eastcott; Sheffield, H. A. Clift; Manchester, W. H. Jago; Birmingham, C. Wallis; South Wales, T. J. Rogers. The accompanying map illustrates the boundaries of these areas.

MAP SHOWING LOCATION AND AREA OF GREAT BRITAIN'S SIX DISTRICTS FOR REGULATING STEEL REQUIREMENTS

The rolling schedules at the principal works are arranged by the steel superintendent in consultation with committees selected from the district, and composed of representatives of the principal mills. It follows that the steel superintendent, who is in constant communication with his colleagues in the other districts, is in a position to give authoritative information as to the prospects of obtaining material. To facilitate a rapid and systematic schedule of rolling, a list of standarized sections has been drawn up and published for information. If industries confine their requirements for sections to the list in question, the ministry states there should rarely be any delay in obtaining supplies necessary to enable work to proceed with promptitude. The needs of the various services and the country generally have been carefully estimated, and the available supplies have been allocated pro rata thereto. In order to insure supplies reaching their allotted destination, statistical returns are regularly received from all manufacturers. These give particulars of deliveries to the various customers, and, in order to enable these returns to be utilized, a system known as "prefix lettering" for orders has been instituted. These letters indicate the service for which the steel is to be used, and it has been ruled that no order be entered or executed unless it bears the lettering followed by the admiralty or ministry of munitions priority or permit reference. All material destined for admiralty purposes, including every type of floating craft, is dealt with under admiralty prefix lettering and contract or permit number. All remaining services are dealt with under ministry of munitions prefix lettering and contract or permit numbers or references.

Where a main contractor receives a contract which it is necessary to sublet,

(*Concluded on page* 813)

Taxes Cut Corporation's Earnings

Allowance of Approximately Quarter Billion, Set Aside for Federal Taxes, Exceeds Balance Remaining for Dividends—Output Decreases Despite Additions to Capacity—Two New Shipyards Under Construction

CHANGED conditions under which the steel industry operated during 1917 are clearly reflected in the sixteenth annual report of the United States Steel Corp., covering the year ending Dec. 31, 1917. The report has just been made public. Gross earnings for the year were $1,683,962,552, compared with $1,231,473,779 in 1916, an increase of $452,488,773. The amount available for dividends was $224,219,565, compared with $271,531,730 in 1916. The regular dividends of 7 per cent on the preferred stock and 5 per cent on the common were paid in 1917, but an extra of 13 per cent was paid in the common, compared with an extra of 3¼ per cent in 1916. An estimated allowance of $233,465,435 was made to cover federal income, war income and excess profits taxes for the year.

Production of the wide variety of products turned out by the corporation generally showed slight declines. The total production of ingots dropped from 20,910,589 tons in 1916, to 20,285,061 tons in 1917. Blast furnace output fell off from 17,607,637 tons in 1916, to 15,652,928 tons in 1917. The output of cement increased from 10,425,600 barrels in 1916, to 10,917,000 barrels in 1917.

Chairman E. H. Gary, in the annual report, says:

"The large demand for iron and steel products which existed during 1916 continued during the year 1917. This was increased after the entrance of the United States into the European war, especially for certain lines of products required for the war program. These demands largely exceeded the producing capacity of the manufacturers and, because of the largely increased cost of labor, raw material and supplies, the prices for steel products advanced materially.

"Two general advances in wage rates of employes of 10 per cent were made on May 1 and Oct. 1, respectively. These followed three increases in 1916, each of substantially the same percentages, and resulted in making the wage rates in effect at close of the year 65 per cent above the rates prevailing at the close of 1915 in the case of unskilled labor and an average of 58 per cent higher in respect of all employes. In December, 1917, the average earnings per employe per day of all the employes, exclusive of the administrative and selling force, was $4.60; and of the total, including the administrative and selling staff, $4.65.

"The smallest number of employes in the service of the corporation and its subsidiary companies during the year in any month was 250,836, and the higest number 277,526. The average number employed during the entire year and the total payroll in comparison with results for 1916 were as follows:

Average number of employes during the entire year: 1917, 268,058; 1916, 252,668; increase, 15,390; per cent, 6.1.

Total amount of payrolls: 1917, $347,370,400; 1916, $263,385,502; increase, $83,984,898; per cent, 31.9.

"During the year 11,486 employes of the United States Steel Corp. and its subsidiary companies entered the regular war service of the United States.

"At Dec. 31, 1917, the tonnage of unfilled orders of the subsidiary companies was 9,381,718 tons of rolled steel products, a decrease in comparison with Dec. 31, 1916, of 2,165,568 tons. The conditions prevailing in respect of governmental regulation of prices, priority orders on production and the demand for war purposes directly and indirectly of a large percentage of the output of the mills,

PRODUCTION OF RAW, SEMIFINISHED AND FINISHED PRODUCTS BY SUBSIDIARIES OF THE UNITED STATES STEEL CORP. IN 1917 AND 1916

Products	1917 Tons	1916 Tons
IRON ORE MINED:		
In the Lake Superior Region		
Mesabi Range	23,806,268	24,928,039
Vermillion Range	1,039,807	1,314,002
Gogebic Range	2,197,554	2,369,460
Menominee Range	1,120,382	996,983
Marquette Range	491,760	647,132
In the Southern Region		
Tennessee Coal, Iron & R. R. Co.'s Mines	3,125,998	3,099,553
Total	31,781,769	33,355,169
LIMESTONE QUARRIED	6,494,917	7,023,474
COAL MINED:		
For use in the manufacture of coke	24,554,525	26,606,041
For steam, gas and all other purposes	6,942,298	6,162,340
Total	31,496,823	32,768,381
COKE MANUFACTURED:		
In Beehive Ovens	11,177,247	12,479,160
In By-Product Ovens	6,284,428	6,422,802
Total	17,461,675	18,901,962
BLAST FURNACE PRODUCTION:		
Pig iron	15,460,638	17,412,049
Spiegel, ferromanganese and ferrosilicon	192,290	195,588
Total	15,652,928	17,607,637
STEEL INGOT PRODUCTION:		
Bessemer ingots	6,405,390	7,273,766
Open-Hearth ingots	13,879,671	13,636,823
Total	20,285,061	20,910,589
ROLLED AND OTHER FINISHED STEEL PRODUCTS FOR SALE:		
Steel rails (heavy and light tee and girder)	1,594,196	1,533,681
Blooms, billets, slabs, sheet and tinplate bars	1,692,348	1,881,526
Plates	1,473,625	1,332,262
Heavy structural shapes	1,004,537	1,029,682
Merchant bars, hoops, skelp, light shapes, etc	2,650,970	2,715,277
Tubing and pipe	1,234,129	1,338,892
Wire rods	267,071	278,197
Wire and wire products	1,821,985	2,004,494
Sheets (black and galvanized) and tinplates	1,740,949	1,786,642
Finished structural work	550,744	557,953
Angle splice bars and all other rail joints	207,846	277,271
Spikes, bolts, nuts and rivets	91,980	95,096
Axles	220,291	173,530
Steel car wheels	110,014	107,167
Sundry steel and iron products	282,226	349,122
Total	14,942,911	15,460,792
Spelter	67,418	55,898
Sulphate of iron	43,942	46,263
Universal Portland cement, bbls	10,917,000	10,425,600

naturally interferes with forward buying by customers.

"The output of the properties and plants of the subsidiary companies in 1917 did not quite reach the record figures of the previous year, notwithstanding additions and extensions completed and placed in operation increased somewhat the capacity. The decrease in production and output in 1917, compared with 1916, is attributable principally to inability to secure sufficient employes to fully man the plants and to the lack of ample transportation service to furnish the plants with necessary raw materials and supplies."

Expenditures in 1917 by all subsidiary companies for maintenance, renewals, including blast furnace relining, amounted to $92,624,329, compared with $69,392,627 iu 1916. Aggregated charges from gross earnings to cover exhaustion of minerals and deterioration amounted to $136,057,605, compared with $104,576,379 in 1916, an increase of 30.1 per cent. Taxes levied against the Corporation and subsidiaries, exclusive of federal income and excess profits taxes, amounted to $18,800,260, in comparison with $16,907,712 for 1916. The estimated allowances of $233,465,435 for federal income, war income and excess profits taxes compares with $9,692,009 allowed for federal income tax in 1916.

Inventory valuations as of Dec. 31, 1917, showed a general increase compared with valuations at the close of the preceding year as follows:

	Dec. 31, 1917	Dec. 31, 1916
Ores—iron, manganese and zinc	$66,536,015	$50,021,287
Pig iron, scrap, ferro and spiegel	16,563,857	18,581,072
Coal, coke and other fuel	6,768,898	4,168,595
Pig tin, lead spelter, copper, nickel, aluminum and dross and skimmings	15,318,114	10,415,759
Limestone, fluxes and refractories	5,646,067	3,904,814
Rolls, molds, stools, annealing boxes, etc.	12,456,223	7,814,775
Manufacturing supplies, stores and sundry items not otherwise classified	36,019,562	23,908,526
Ingots—steel	2,947,003	1,930,101
Blooms, billets, slabs, sheet and tin plate bars, etc.	13,683,437	11,659,281
Wire rods	1,223,347	893,491
Skelp	1,685,362	1,566,349
Finished products	33,545,964	30,612,642
Mining supplies and stores (for ore and coal properties)	7,768,634	4,083,029
Railroad supplies and stores	9,651,450	5,941,113
Merchandise of supply companies	1,333,388	962,945
Material labor and expense locked up in bridge and structural contracts	$47,357,922	
Less, bills rendered on account	41,614,031	
	5,743,891	4,265,981
Stocks abroad and on consignment	8,376,794	9,738,287
Material in transit	8,670,750	4,957,751
Total	$253,938,756	$195,425,798
Less, reserve for account of actual cost or market value of stocks in excess of normal prices therefor	30,270,670	13,524,794
Balance	$223,668,086	$181,901,004

The expenditures for 1916 for acquisition of additional properties, new plants and for extensions and construction, including mine development aggregated $117,977,118.

The average number of employes during 1917 was 268,058, compared with 262,668 in 1916. Employes were distributed as follows:

Employes of	1917 Number	1916 Number
Manufacturing properties	198,711	187,289
Total salaries and wages		
Coal and coke properties	26,189	25,143
Iron ore properties	13 198	12,624
Transportation properties	26,210	24,189
Miscellaneous properties	3,750	3,423
Total	268,058	252,668
Total salaries and wages paid	$347,370,00	$263,385,502
Average salary or wage per employe per day:		
All employes, exclusive of general administrative and selling force	$4.10	$3.29
Total employes, including general administrative and selling force	4.16	3.36

Domestic shipments in 1916 showed a loss of 0.4 per cent, not including cement, which decreased 4.3 per cent. Export shipments decreased 12.3 per cent.

The new construction program in 1917, in addition to the work carried out at the various steel plants, was marked by the entrance of the Corporation into the shipbuilding field. Two yards are under construction, one on the Hackensack river, near Newark, N. J., and one on the Chickasaw river, near Mobile, Ala. Both yards will have 10 shipways. The New Jersey plant will complete 10 ships this year. Extensive improvements are being made at the Fairfield works in the Birmingham, Ala., district, to permit the fabrication of the steel required at the new Mobile ship plant.

CORPORATION ACCOUNT, UNITED STATES STEEL CORP., FOR FISCAL YEARS ENDING DEC. 31, 1917 AND 1916

COMPARATIVE INCOME ACCOUNT
For the Fiscal Years Ending Dec. 31, 1917 and 1916

	1917	1916	+Increase —Decrease
EARNINGS:—Before charging interest on bonds and mort. of subsid. comps.:			
First quarter	$78,994,371.04	$63,110,720.27	+$15,883,650.77
Second quarter	90,592,701.88	83,501,065.24	+ 7,091,636.64
Third quarter	73,007,297.57	88,159,733.30	— 15,152,435.73
Fourth quarter	61,567,101.04	108,225,573.63	— 46,658,472.59
Total for year	*$304,161,471.53	$342.997,092.44	—$38,835,620.91
Less, interest on outstanding bonds and mortgages of the subsid. companies.	8,869,291.50	9,422,914.94	— 553,623.44
Balance of earnings	$295,292,180.03	$333,574,177.50	—$38,281,997.47
Less, charges and allowances for depreciation applied as follows, viz.:			
To deprec. and extraord. replacem't funds and sink'g f'ds on bonds of sub. cos.	43,296,038.26	32,762,072.38	+ 10,533,965.88
To sink. funds on U. S. Steel Corp. bds.	7,257,233.41	6,785,540.27	+ 471,693.14
Net income in the year	$244,738,908.36	$294,026,564.85	—$49,287,656.49
Deduct:			
Int. on U. S. Steel Corp. bonds outstdg.	21,256,303.17	21,602,852.90	— 346,549.73
Premium paid on bonds redeemed, viz.:			
On subsid. cos. bonds	117,914.50	146,277.11	— 28,362.61
On U. S. Steel Corp. bonds	745,933.69	870,673.57	— 124,739.88
Balance	$222,618,757.00	$271,406,761.27	—$48,788,004.27
Add: Net bal. of sundry charges and cred., incld. adjust. of various accounts	1,600,807 54	124,969.11	+ 1,475,838.43
Balance	$224,219,564.54	$271,531,730.38	—$47,312,165.84
Dividends on U. S. Steel Corp. stocks, viz.:			
Preferred, 7 per cent	25,219,677.00	25,219,677.00	
Common, (1917, regular 5 per cent, extra 13 per cent; 1916, regular 5 per cent, extra 3¾ per cent)	91,494,450.00	44,476,468.75	+ 47,017,981.25
Net income	$107,505,437.54	$201,835,584.63	—$94,330,147.09
Less, appropriated from net inc., on acct. of expend. made and to be made on authorized approp. for add. prop., new plans and construction	55,000,000.00		+ 55,000,000.00
Balance carried to undivided surplus	$52,505,437.54	$201,835,584.63	—$149,330,147.09

*Balance of earnings after making allowances for estimated amount of Federal income and war excess profits taxes.

Henry Potts & Co., 650 Real Estate Trust building, Philadelphia, have recently purchased the entire electrical equipment of the power house of the Reading Transit & Light Co., Collegeville, Pa. It is their intention to begin dismantling at an early date.

The Lutz Co., Inc., Philadelphia, has taken over the Joseph Pedrick Foundry Co., Camden, N. J., which operates a gray iron foundry.

War Center

Being Established at Pittsburgh to Speed Up Production

Pittsburgh is being made into one of the important war centers of the country and the necessary organization to that end now is being carried out. To study problems of individual plants and possibly to work out scientific systems of operation, a corps of industrial experts numbering approximately 400 instead of the 100 originally proposed is being assembled by the government. This corps will assist Ralph M. Dravo, of the Dravo Contracting Co., who recently was appointed head of the Pittsburgh office, production division of the munition district established by the war department.

The ordnance work has been divided into three departments and the following commissioned heads have been named: Maj. Edgar A. Custer, chief of inspection section; Maj. H. H. Scovil, chief assistant to Mr. Dravo, head of production section, and Lieut. Samuel Goodacre, chief of finance section. Others are being added daily. Capt. Harold Bope, son of Col. H. P. Bope, first vice president and general manager of sales of the Carnegie Steel Co., is Major Custer's chief aide, and Capt. H. C. Armstrong, formerly of the navy department, also is on the inspection division. The main purpose of this organization is to expedite production. The finance division is authorized to proceed promptly with payments on certain war contracts and Lieutenant Goodacre's checks on the United States treasurer will be the first issued through divisional headquarters. In this way delayed payments will be reduced to a minimum.

Pittsburgh likewise has been made a controlling center of airplane metal and other materials. The equipment division of the signal corps in charge of Capt. G. L. Norris and William Frew Long in the Keenan building, has sent out calls for 200 experienced inspectors, chemists, testing engineers, metallurgists, metallographists, machisists, etc. Captain Norris is district manager of equipment and chief metallurgist of the equipment division of the United States signal corps. The Pittsburgh testing laboratory has been leased for the duration of war and will be in charge of Captain Norris, with Dr. H. T. Beans as chief chemist and Prof. J. S. Macgregor chief of physical tests.

Additions to its facilities for hot tinning of gray and malleable iron, steel and brass stampings, etc., have been made by the New Standard Hardware Works, Mount Joy, Pa., much new equipment being installed. M. A. Rollman is president of the concern; C. J. Schiemer, vice president, and E. E. Roller is secretary and treasurer.

Has Large War Orders

The J. G. Brill Co., Philadelphia, in its report for 1917 shows total income of $7,706,199, an increase of $1,525,204 over 1916. The balance available for dividends was $904,189, equal to $19.74 a share earned on the $4,580,000 preferred stock, compared with $2 in 1916. President Samuel M. Curwen, in his remarks to stockholders, says the company has large orders from the government for army field equipment, including car and truck orders. In order to assist in the airplane program, the Wason plant of the company at Springfield, Mass., has been devoted to airplane manufacture since the latter part of 1917. Work on hand Feb. 6, including airplane orders, amounted to more than $20,000,000.

Sold Up For 1918

Chairman J. Frater Taylor, of the Lake Superior Corp., in a letter to stockholders, says: "Practically the entire steel output for 1918 is now sold. The unfilled orders on hand Dec. 31 represent 437,951 tons. Adequate supplies of raw materials are now on hand. Enough coal has been secured to carry through until navigation opens. Blast furnace operations were interfered with during December. We believe, however, that in respect of these conditions we fared better than many other similar plants and we are pleased to report the situation now is improving."

Providing Steel in Great Britain

(*Concluded from page* 810)

it is imperative that his sub-orders, and those of all sub-contractors, etc., should bear the prefix lettering and reference allotted for the main contract. The intention is that as far as practicable every area should be self-supporting, that is, firms within an area should obtain their supplies of steel from manufacturers in their area. It is particularly necessary says the ministry that firms outside Scotland should not obtain materials from that area and vice versa.

In view of the vital importance of shipbuilding it is necessary that rolling mills producing large size plates should be employed for that industry alone. It is considered necessary that the capacity of what are known as "re-rollers," that is, mills which purchase semi-finished material for rolling, should have their capacities utilized to the utmost possible extent. Such firms produce plates and sheets limited in size and area, and it has been found necessary to adopt, as far as practicable, standard sizes of light plates to meet their technical difficulties. Such standard sizes are—plates, 8, 10 and 12 feet long by either 3, 3.6 or 4 feet wide, in thicknesses of ⅛, 7/64 and ¼ inches. Consumers are recommended to employ these plates wherever practicable in their designs even although a certain amount of increased cost and workmanship is involved in so doing. Much of the difficulty and delay which has been experienced in obtaining supplies of thin and light plates the admiralty believes will be removed by the methods it has adopted.

Install Reduction Unit

A demonstrating plant for the reduction of ores by the Lockwood electrolytic process will be installed at Spokane, Wash. It will have the rating of 10 tons and is expected to be in operation within 60 days. M. C. Knowles, of London, is in charge of the enterprise. A 2-ton plant also for demonstrating purposes has been in operation in New Jersey. Mitsui & Co. are reported to have contracted to use this process of reduction in their properties in Japan and China.

Acquires Mill Site

The United Steel Co., which contemplates the erection of a rolling mill at Everett, Wash., is making preparations for active construction. A four-acre site has been secured for the plant with options on unlimited area. Head offices have been established at 2829 Rockefeller avenue. J. Johnson, general superintendent, has left for the east to secure machinery and equipment.

Converts Blooming Mill

The Penn Seaboard Steel Corp. recently purchased a 34-inch, 2-high blooming mill, originally made for the Chattanooga Steel Co., but never installed. It has converted this into a 2-high, 84-inch plate mill, which it is installing at its Baldt Works, New Castle, Del.

The Bethlehem Steel Co. is relining its Lebanon "A" stack, which was blown out on Feb. 14.

Iron and Steel Financial News

Up-to-the-Minute Fact and Comment Collected and Sifted For Busy Readers

War Frames Policies of All Industries

THE pamphlet report of the year 1917 shows graphically the Bethlehem Steel Corp. for the extent to which Bethlehem and its subsidiaries are contributing to the preparation of the United States for war. At the close of the year the company had unfilled orders of $453,800,000, of which total its shipbuilding subsidiary held $273,000,000. On Jan. 1, 1914, the company had on its books orders amounting to only 5 per cent of total on hand Jan. 1, 1918, making it apparent that the plants of the corporation now are taxed to capacity.

Chairman Charles M. Schwab and President Eugene G. Grace, in a jointly signed statement, told stockholders that plant extensions not considered vital to the production of material for the government had been postponed or cancelled. This statement said in part:

"The entry of the United States into the war has caused a profound change in the policies and business methods of all industrial concerns. The demands of the government for materials and products necessary for the prosecution of the war, the adoption of the policy of government control of prices, and the operation of war revenue measures have compelled radical changes in plans for extensions and financing. Such plant extensions as have not been considered vital to the production of materials for government use, have been cancelled or postponed, and every effort has been made to concentrate upon the absolute essentials needed for the prosecution of the war. The maintenance of earnings before deducting federal taxes at approximately the figures of the previous year, notwithstanding regulated selling prices of prices and unregulated higher costs of wages and of many raw materials which have resulted in decreased percentage of profit, have been in large measure due to the increased volume of business. In common with all other large interests we have gladly subscribed to the price-fixing policy adopted by the government; and while many inequalities exist in the application of the details of the policy, we are hopeful that they will eventually be adjusted. The adoption by the government of the 'cost plus' and 'cost fee' methods of determining the contract price has presented difficulties in application and interpretation, but they have not been permitted to delay the progress of the work in hand.

"The government has recognized the inability of corporations to command, in competition with it, the capital necessary for executing its war orders, and both the army department and the navy department have assisted to a large extent in financing such orders. Except for this assistance, it would have been impossible for your corporation to have undertaken all the work required from it by the government."

The company paid bonuses to officers and heads of departments in 1917 amounting to $3,913,833.50, the percentage of this sum to the total net earnings of the corporation being 7.96 per cent. The number of men employed during the year was 64,782, compared with 47,013 in 1916, while the payroll was $83,978,312, against $51,499,773. The balance sheet showed assets and liabilities of $381,541,940, current assets amounting to $153,919,965, of which raw materials and contracts in progress comprised about $71,051,937. The company's comparative income accounts for the year 1917 and 1916 is shown below.

	1917 Amount	1917 Per cent	1916 Amount	1916 Per cent	Increase
Gross sales and earnings	$298,929,530	100.00	$216,284,555	100.00	$82,644,975
Mfg. cost, oper. expense, etc.	234,437,464	78.43	151,278,301	69.94	83,159,163
Taxes	13,489,293	4.51	4,913,702	2.27	8,575,591
	$247,926,758	82.94	$156,192,004	72.21	$91,734,754
Manufacturing profit	51,002,772	17.06	60,092,551	27.78	*9,089,779
Interest, divs. and other income	2,976,587	1.00	1,624,758	0.75	1,351,829
Total net earnings	$53,979,360	18.06	$61,717,309	28.53	*$7,737,949
Interest and discount on bonds, mortgages, etc.	8,746,982	2.93	3,772,555	1.74	4,974,426
Balance	$45,232,377	15.13	$57,944,753	26.79	*$12,712,376
Depreciation and depletion	17,911,640	5.99	14,350,785	6.63	3,560,854
Net income	$27,320,736	9.14	$43,593,968	20.16	*$16,273,231

*Decrease.

The net earnings from operations, after deducting expenditures for ordinary and extraordinary supplies and maintenance, for the years 1905 to 1917, inclusive, follow:

1905	$3,622,475.50
1906	2,011,368.34
1907	2,642,178.07
1908	2,196,172.04
1909	2,993,536.31
1910	4,524,141.30
1911	4,792,713.53
1912	5,114,439.98
1913	8,752,671.44
1914	9,649,667.71
1915	24,821,408.25
1916	61,717,309.58
1917	53,979,360.08
	$186,817,442.13

Virginia Company Clears Yards of Pig Iron

In his statement to stockholders, accompanying the fifteenth annual report of the Virginia Iron, Coal & Coke Co., Roanoke, Va., President John B. Newton says: "We feel that the results obtained in the pig iron department deserve especial mention by reason of the fact that on July 1, 1916, there were stocked on your furnace yards 19,254 tons of pig iron and that at the close of this year, Dec. 31, 1917, your furnaces had produced more pig iron than ever before in the history of the company for a like period, and in spite of labor and car shortages, embargoes, etc., every ton of iron made had been shipped and the stock on hand reduced to 1691 tons."

With a change in the fiscal year to Dec. 31, no statement was issued as of June 30, 1917, and the report gives the net profit from operations

for the year ended on that date as $1,024,364, with net profits for the six months period ended Dec. 31, 1917, as $873,179, a total gain for the 18 months of $1,897,543. In the 18 months the debit to profit and loss was reduced $1,736,992, bills payable $1,187,225 and bonded indebtedness $594,000.

In the 18 months 2,686,723 tons of coal were mined and 597,232 tons of coke and 345,508 tons of pig iron were manufactured. The tonnages of coal and pig iron shipped were 1,690,653 and 372,738 respectively. Coal used in manufacturing coke totaled 996,070 tons while the coke consumed in the manufacture of pig iron was 598,823 tons.

Total receipts from operations were $13,129,239, while operating expenses were $10,138,045 in the 18 months, leaving gross profit of $2,991,194 from which overhead charges, interest on bonds, taxes, etc., of $1,093,650 were deducted, leaving $1,897,543 as the net profit. The income account follows:

	6 mo. end. Dec. 31, '17	Year end. June 30, '17
Inc. from oper., etc...	$5,314,324	$7,675,856
Operating expenses....	4,030,504	6,107,542
Net receipts	$1,283,820	$1,568,314
Other income	53,429	85,630
Total income	$1,337,249	$1,653,944
Tax., int., all oth. chg.	464,070	629,580
Net profit	$873,179	$1,024,364

Bliss Earnings Drop

In the annual report of the E. W. Bliss Co., New York, the net earnings, after deduction for federal taxes and depreciation, are given as $2,339,295. In 1916, they were $10,565,321. After preferred dividends, the balance of earnings for the $1,250,000 common stock ($50 par value) was equal to $89.57 a share, as against $418.61 a share in 1916, and $217.28 in 1915. The comparative income account of the company follows:

	1917	1916
Net earnings .....†$2,339,295		$10,565,321
Preferred dividends....	100,000	100,000
Balance for common..	2,239,295	10,465,321
Common dividends.....	625,000	4,093,750
Surplus	1,614,295	6,371,571
Prem. on bonds retired	.....	74,880
Surplus for year.....	1,614,295	6,296,691
Previous surplus	13,721,839	7,425,148
Total surplus	15,536,134	13,721,839

†After provision for depreciation and federal taxes.

Allis-Chalmers' Gain Big

For the year ended Dec. 31, 1917, the Allis-Chalmers Mfg. Co., Milwaukee, gives its total sales as $26,129,317, as against $19,440,509. After all deductions, including $1,298,300 for federal taxes, the net earnings were $4,010,490, equal to $24.74 a share on $16,206,700 preferred outstanding stock, as against $3,165,020, or $19.18 per share. Surplus for the year amounted to $2,392,115 as compared with $1,738,565 in 1916. A comparative income account follows:

	1917	1916
Sales billed	$26,129,317	$19,440,509
Costs, etc.	19,144,107	14,699,744
Manufacturing profits..	5,078,946	2,902,312
Net profit	5,308,790	3,165,020
Federal taxes	1,298,300	.....
Balance	†4,010,490	3,165,020
Preferred dividends....	*1,618,375	1,426,455
Surplus for year.....	2,392,115	1,738,565
Profit and loss surplus	5,463,604	3,071,488

*Consists of 7 per cent regular preferred dividends and 3 per cent on account of dividends in arrears.

†Equal to $24.74 a share on $16,206,700 preferred outstanding, compared with $19.18 a share earned in 1916.

A copy of this report has been filed with the New York stock exchange in connection with the company's application for listing additional preferred and common stock.

Cambria Steel Co. Profits Exceed Par Stock

The Cambria Steel Co. in 1917 reports profits for 1917 in excess of its outstanding capital stock, before deduction for depreciation and federal taxes. The total net income was $47,121,669, which is more than $2,000,000 over the par of the stock and an increase of $19,610,000 over 1916. The balance of $25,721,853 after allowance for taxes and other charges equaled 57 per cent on the stock, about the same as in 1916. There was $3,996,700 reserved for depreciation, or about twice the amount of this item in 1916 and the $17,264,396 estimated war income and excess profits taxes represented 35 per cent of the net. The Midvale Steel & Ordnance Co. owns about $43,753,400 worth of the $45,000,000 stock outstanding and dividends from Cambria amounting to about $5,400,000 went into the Midvale treasury, excepting about $160,000. These dividends were equal to about 11 per cent on the stock. The surplus of $20,321,853 stood out powerfully in contrast with the deficit of $289,010 in 1914. In 1916, the net earnings were $27,511,794, dividends of $3,037,500 were paid and a surplus of $22,056,853 remained.

Explains Hog Island

The annual report of the American International Corp. for 1917 was largely given over to a detailed explanation of the Hog Island shipyard undertaking by President Charles A. Stone. The report recites the history of the company from the time it was organized to promote America's foreign trade, until the present, when the corporation has under way the most gigantic shipbuilding project of modern times. During the year the company paid $1,574,175 in dividends against $375,000 in 1916. The sum of $375,000 was reserved for taxes, as compared with a similar reserve of $521,810 in 1916. The Hog Island operation is reflected in the balance sheet with an item of $1,732,582 representing real estate investment in the shipyard site. The comparative income account follows:

	1917	1916
Interest, dividends & earnings	$6,830,394.46	$3,839,876
Interest	102,776.00	.....
Taxes	403,761.00	447,655
Other expenses	2,577,733.00	908,277
	3,084,272.29	1,355,933
Net earnings	$3,746,122.17	2,483,943
Surp. Dec. 31, 1916..	1,923,539.43	19,023
Gross surplus	$5,669,661.60	$2,464,919
Dividends	1,574,175.00	375,000
Chgs. and adjustm'ts	587,973.26	166,379
	2,162,148.26	541,379
Surplus Dec. 31, 1917	$3,507,513.34	$1,923,539

Surplus is Raised

Net earnings of the New York Shipbuilding Corp., subsidiary of the American International Corp., for the year 1917, amounted to $1,753,099, of which $963,914 represents profits on the company's shipbuilding operations, and the balance from various external operations. The whole amount was added to the company's previous surplus of $38,390, bringing the total surplus as of Dec. 31 to $1,791,449. The present company was incorporated Nov. 29, 1916, to take over the entire assets of the old New York Shipbuilding Co., and consequently 1917 was its first full business year. Its plant is engaged in government work, principally large warships and destroyers for the navy.

Wheel Earnings Good

With $250,000 reserved for income and excess profits taxes, the Griffin Wheel Co., Chicago, reports that its net profit for 1917 was approximately $1,100,000. Prices on its product have not been raised between 1884 and January, 1917, except in 1907, when the advance was later reduced to normal. Last year increased costs made a raise obligatory. At the close of business, Dec. 31, 1917, Griffin Wheel had net quick assets of over $6,000,000, of which $1,007,000 was cash and $1,500,000 United States government and state securities. While still following its policy of always paying one year's dividends out of the previous year's earnings, Griffin Wheel Co., in order to clear up its surplus account in preparation for taxes, will on March 1 anticipate its semiannual dividend of 3½ per cent on the 92,820 shares of common stock outstanding, due Sept. 1, and pay a full year's dividend calling for $649,740 out of the past 12 months' operations.

Recently the Westinghouse Electric & Mfg. Co., Pittsburgh, effected the lease of the Baxter Stove Co.'s property at Mansfield, O. Here it will consolidate the manufacture of heating appliances carried on elsewhere

Small Lot Inquiries Predominate

Steady Demand is Noted in All Centers for Single Machines and Small Lots —Heavy Ordnance Contracts Are Expected to Furnish Large Requirements—Brazil Will Make Munitions

INQUIRIES for small lots of tools continue to come out steadily. Few large requirements are in sight, although increased production of heavy ordnance both for the navy and army is contemplated and the present facilities for this manufacture are to be expanded rapidly. Some provisional inquiries in the central and western districts for heavy tools indicate a preparation for heavy gun and gun mount manufacture. Shell orders continue to be distributed principally among those firms which have shown the ability and have the equipment to handle this class of work. Opinion is expressed that the Chicago district will receive a large share of future war contracts, although a wide distribution of awards is assured from Washington. It is said that waterway transportation will be a factor considered in allotting some of the new undertakings.

An awakening knowledge of our shipping situation renders possible the statement that many more shipyards will be projected in the near future, with an accompanying demand for cranes of various classes. Two yards will probably be started soon. They are the Brunswick, Ga., yard of the Southern Shipbuilding Corp. and a plant at Curtis Bay, Md., proposed by the newly organized Curtis Bay Shipbuilding Co. The Carolina Shipbuilding Corp., with temporary offices in New York has been organized to build a new yard at Charleston, S. C. The crane market is slow at present, but indications point to an early revival of inquiries.

Shipping conditions continue to improve, and deliveries are promised within reasonable limits except on a few classes of equipment. Another source of danger to the industry, however, is apprehended by some dealers. The impending shortage of foundry iron is feared as limiting production. A feeling prevails, however, that the situation will be met without injury to the trade, as the necessity is too apparent to warrant any supposition of the government allowing a curtailing of vital machine tool manufacture.

Steady Buying of Small Lots Still Governs

ATTENTION of machine tool builders in the east is being centered more and more on the government's program for increased production of heavy ordnance. At present, aside from government shops, there are practically only three plants in the country with facilities for handling work of this description. As a result huge expansion is believed necessary. However, so far as can be learned, no definite steps have yet been taken in this direction. In the meantime, the comparative lull which has prevailed in the eastern market during the past few weeks continues.

Trading at this time is made up almost entirely of small orders; in fact, little in the way of large buying has taken place since the Singer Mfg. Co. recently closed on tools needed by its Elizabethport, N. J., plant for the manufacture of carriages for 75-millimeter guns. There are, however, a few large lists pending such as the inquiry of the Wright-Martin Aircraft Corp., which came before the market a couple of weeks ago. Another sizable inquiry, although much smaller than that of the Wright-Martin company, is the list issued recently by the Chester Shipbuilding Co., Chester, Pa., involving approximately 70 tools of miscellaneous types.

Brazil Seeks Munitions Tools

A number of tools are expected to be purchased shortly by the Brazilian commission now in New York, although as yet a list has not been issued. The commission recently arrived in this country and is perfecting plans for the establishment of munition works in Brazil for the manufacture of 3, 4 and 6-inch shells; it is also understood a plant will be erected for the manufacture of rifles. It is reported that the Austin Co. has the contract for the construction work involved in these projects.

The government recently has awarded contracts to five companies, two of which are located in the east, one at Albany, N. Y., and the other at Meriden, Conn., for the manufacture of the new 6-inch Stokes-Newton trench mortar bombs. These companies it is understood are inquiring for milling machines and other equipment. The Neptune Meter Co., Long Island City, N. Y., continues to buy miscellaneous tools. The Remington Arms-Union Metallic Cartridge Co. has recently bought 30 to 40 small milling machines, and still is in the market. The Watervliet arsenal has also just closed on some additional equipment.

Industrial Conditions Improve

Industrial expansion in the east continues in fairly good volume. The Barlow Foundry, Inc., Newark, N. J., is doubling the capacity of its gray iron foundry. The Potdevin Machine Co., Brooklyn, has awarded contracts for the construction of a $20,000 machine shop addition. The Buffalo Nipple & Machine Co. contemplates the erection of an addition to its plant. The L. W. F. Engineering Co., College Point, L. I., N. Y., manufacturer of airplanes, is increasing its plant at a cost of about $25,000. The Wisdom Tool & Machine Co., Naugatuck, Conn., also is enlarging its plant.

The Southern Shipbuilding Corp., 17 Battery place, New York City, which has been figuring on the construction of a yard at Charleston, S. C., is understood to have abandoned this project for the erection of a yard at Brunswick, Ga., costing $1,500,000. The company orig-

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The Ancient Grecians, in art, in sculpture, in sport, even in living, strove toward a goal—perfection—Agathon. Histories, art galleries and museums are filled with evidences of the result.

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Chicago Office:—1370 People's Gas Bldg. 122 So. Michigan Blvd.
C. H. Beach, District Sales Manager

Philadelphia Office:—603 Widener Bldg.
Frank Wallace, District Sales Manager

Syracuse Office:—621 University Block,
T. B. Davies, District Sales Manager

J. E. Dockendorff & Co., 20 Broad Street, New York,
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inally had a government contract for 16 vessels of 7500 tons deadweight capacity, and an option on a similar contract. The proposed yard at Brunswick, Ga., will do government work but under an altered agreement. It is stated that bids on equipment will be asked in about three weeks. Locomotive cranes, it is understood, will be used at the ways, while jib cranes will be installed in the plate and angle shops. Another new shipyard to be established in the east will be that of the Curtis Bay Shipbuilding Co., which recently was incorporated with $2,000,000. The yard will be located along Curtis bay, in Maryland, and will be used for the construction of steel vessels. James H. Preston, mayor of Baltimore, is one of the incorporators.

Crane Business is Slow

Competition in the crane market is becoming more strong, as a result of a continued lull. Sellers, particularly those dealing in electric travelers, report few new inquiries, although a fair amount of business is pending. At present, the General Electric Co., Schenectady, N. Y., is inquiring for a 20-ton electric crane for export. Markt & Hammacher, 193 West street, New York, are asking prices on a foundry crane for shipment to Spain. The New York Air Brake Co. is in the market for a 5-ton electric crane with a 47-foot span. Fox Brothers & Co., 126 La Fayette street, New York, are inquiring for four electric cranes, ranging from 15 to 25 tons capacity. The Merchant Shipbuilding Co., 165 Broadway, New York, has not closed on its inquiry for four electric cranes, but is expected to do so shortly. William Cramp & Sons Ship & Engine Building Co. still is negotiating for four 10-ton cranes of 106-foot span.

Chicago Expects Munitions and Ordnance Contracts

THOUGH buying of machine tool equipment in the Chicago territory still consists for the most part of small lots and lighter tools, some larger business seems likely to come out shortly. The general expectation is that war demand will continue and smaller manufacturers are increasing their equipment to meet the conditions. The demand at present indicates a wider distribution of war business. Agricultural implement manufacturers, especially those building tractors, are adding to their machine shop equipment, some fair orders having been taken recently from this source. Two concerns with munition contracts are seriously considering doubling their facilities. The Chicago Ordnance Co., for which the Arnold Co., Chicago, is making plans, apparently is working out in more definite form. This project is backed by the Chicago Association of Commerce and is a composite undertaking. The Standard Steel Car Co., Hammond, Ind., which is equipping for war work, is placing its equipment after several delays. Much remains to be bought. Deliveries are improving in most lines and recently an order for boring mills obtained shipment in 10 days. Planers are still slow and some makers cannot promise earlier than six months. Gits Bros. Mfg. Co. will build an additional machine shop. The Western Electric Co., Cicero, Chicago, is building a six-story factory, 211 x 675 feet. The Aurora Tool Works, Aurora, Ill., will build an addition. The Muncie Gear Co., Muncie, Ind., will build an addition. The Jenkins Machine Co., Sheboygan, Wis., will build a machine shop addition. The United Steel Co., Everett, Wash., a newly chartered concern, is about to start the erection of a rolling mill.

Heavy Tool Demand is Increasing

AN INCREASING demand is indicated by the diversified inquiries, none of which is large, received in the Cleveland machine tool market during the past week. Light equipment is still wanted by contractors working on parts for airplane and motor construction. The demand for heavy machines is increasing, particularly from Detroit and Toledo, where new ordnance work impends. There has been some shifting of war orders in this district, based probably on results shown in contract work to date. This readjustment may in some measure indicate a clearing of decks for action on contracts to come. Tool buying is limited almost entirely to firms with war work, shipping conditions and prevailing high prices serving to discourage strictly private enterprise except where tools are needed for replacements. Used equipment is in active demand and a large list of inquiries probably will remain unsatisfied due to the scarcity of machines for sale.

New Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Among New England Factories

PORTLAND, ME.—The Cumberland Motor Sales Co., Inc., has been incorporated to manufacture motor vehicles, airplanes and engines, with $10,000 capital. E. C. Keith and Thomas A. Sander are interested.

ROCKLAND, ME.—The Francis Cobb Shipbuilding Co. has been incorporated and has taken over the shipyard of the Cobb estate, Atlantic wharf. The shipyard will be enlarged. The incorporators are H. Nelson McDougall, Benjamin C. Perry, Maynard S. Bird, Portland, Me., and others. B. C. Perry is treasurer and general manager.

ATTLEBORO, MASS.—The Frank G. Rowley Co. has received the contract for the $50,000 pattern storage building to be erected for the Howard & Burroughs-American Machine Co. The new building will be two stories, 74 x 100 feet.

BOSTON.—The Arthur C. Harvey Co., importer and dealer in iron, steel and metals, has purchased a tract of 275,000 square feet of land on Everett street, Brighton district, and will erect several large buildings for manufacturing purposes at an estimated cost of $300,000.

CAMBRIDGE, MASS. — The Cambridge Electric Light Co. is taking bids on the erection of a 1-story, 30 x 50-foot addition to its boiler house.

FALL RIVER, MASS.—The Fall River Iron & Metal Co. has been incorporated with $10,000 capital by Joseph Bloomberg, Ignatz Bazar, Providence, R. I., and Samuel Bloomberg.

GARDNER, MASS.—The Peterboro Mfg. Co. will build a brick, 2-story and basement, 28 x 80-foot addition to its factory on West street.

MILLBURY, MASS. — Peter Lynch, Wilkinsonville, Mass., has bought the property of the Charles Buck Tool Co., Grafton street, and will remove his shuttle iron manufacturing business there.

SPRINGFIELD, MASS.—A. A. Shea,

EXPANSION with ROLLING MILL JIM

Say fellows—was out to the Hubbard the other day and the boys showed me the plans of the new steel foundry they're putting up. She sure is a humdinger—electric furnaces and all that. The next time I go over I'll rubber around a lot more and tell you all about it.

So long,

Rolling Mill Jim.

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

Inc., has been incorporated to manufacture electrical machinery and equipment with $12,000 capital. Augustus A. Shea, L. R. Schechterle and E. J. Roberts are interested.

WORCESTER, MASS.—The Sawyer Lumber Co. will make several additions to its mill, including a power plant.

PAWTUCKET, R. I.—The J. O. Draper Co. will build a brick 4-story, 75 x 100-foot factory on Front street.

PROVIDENCE, R. I.—The United States Rubber Co. has purchased the plant of the American Locomotive Co. and will equip part of it for the manufacture of balloons for the United States government.

WOONSOCKET, R. I.—The Tafe-Pierce Shoe Co. will build a reinforced concrete and brick 4-story, 45 x 132-foot addition to its factory, to cost $60,000.

BRIDGEPORT, CONN. — The Automobile Tractor Co. has been incorporated to manuture tractors and accessories with $150,000 capital by Charles H. Davis, West Haven, Conn., James R. Booth and Frederic A. Bartlett.

EAST HARTFORD, CONN.—The Gildersleeve Ship Construction Co., Gildersleeve, Conn., has leased the plant of the Hartford & New York Transportation Co., at East Hartford, Conn., to build barges for the United States war department, and plans to build four new shipways. Machinery will be required for the carpenter and machine shops.

NAUGATUCK, CONN.—The Risdon Tool & Machine Co. has awarded to the Fred T. Ley Co., Springfield, Mass., the contract for a factory building, 1-story high and 98 x 104 feet in size, of frame construction. This is the first of two large additions to be built to this plant.

NEW LONDON, CONN.—The New London Chemical Co. has been incorporated with $50,000 capital by Bert W. Flanders, Ira M. Comstock and H. Ernest Harris.

Along the Middle Atlantic Seaboard

BROOKLYN, N. Y.—A charter of incorporation has been granted to the Menten Brass Co., Inc., capitalized at $25,000. The incorporators are A. J. Menten, B. E. Menten, and R. Weller, 1547 Broadway, New York.

BROOKLYN, N. Y.—The Turner Construction Co., 244 Madison avenue, New York, will make alterations to the plant of A. Schrader's Sons, Inc., manufacturer of diving apparatus, 783 Atlantic avenue.

BUFFALO.—The Liberty Aircraft Corp. has been organized with $1,000,000 capital to manufacture airplanes and tractors. The incorporators include H. L. Jauch, D. G. Drew and others.

BUFFALO.—Plans have been prepared and bids taken for a forge shop, 130 x 300 feet, to be built by the Delaney Forge Co. The company plans to build a machine shop 100 x 250 feet.

BUFFALO.—The O'Neil Iron Works has awarded to the Lackawanna Bridge Co. the contract for a plant addition to cost $100,000, for use as an erecting shop.

BUFFALO.—An addition to the plant of the Hard Mfg. Co. will be built at a cost of $40,000. It will be two stories high and 75 x 150 feet in size.

BUFFALO.—The Lackawanna Bridge Co. has been awarded the general contract for the construction of an addition to the plant of the O'Neil Iron Works, 269 Perry street.

BUFFALO.—Architect Lewis Greenstein is receiving bids on a brick and steel factory building, 1-story, 35 x 100 feet, for an owner whose name is withheld.

BUFFALO.—The Stewart Motor Co. is having plans drawn by Lewis & Hill, architects, for a storage and assembling building, 1-story, 92 x 110 feet.

BUFFALO.—A charter of incorporation has been granted to the Aldrich Mfg. Co., capitalized at $400,000, to manufacture copper, brass and other metal products. The incorporators are L. E. Desbecker, W. C. Newcomb, I. L. Fisk, 604 D. S. Morgan building, and others.

BUFFALO.—The Buffalo Contractors Plant Corp., 129 Erie street, has purchased a factory which it will equip for the manufacture of hoisting machinery and building equipment.

DEPEW, N. Y.—The American Car & Foundry Co. will make several alterations and additions to its plant in this city.

DUNKIRK, N. Y.—The Atlas Drawn Steel Corp., manufacturer of steel and wire products, has incorporated its business with a capital of $275,000, to provide for plant expansion.

EAST JAMESTOWN, N. Y.—A $30,000 addition will be erected at the plant of the Jamestown Wood Finishing Co. The new building will be two stories, 35 x 100 feet.

ELMIRA, N. Y.—The Willys Motor Co. will erect an $80,000 addition to its branch plant in this city. The proposed structure, 1-story, 90 x 400 feet, will be erected from plans drawn by Architects Mills, Rhines, Bellman & Nordhoff, Detroit. The Lowman Construction Co., Elmira, will be in charge of the work.

FULTON, N. Y.—The Fulton Steel Corp., Woolworth building, plans to build an addition to its foundry in this city.

JAMESTOWN, N. Y.—The Crescent Tool Co. is having plans drawn for the construction of a power house and coal storage building. F. A. Shoemaker, Buffalo, is engineer in charge.

MEDINA, N. Y.—The A. L. Swett Iron Works has increased its capital from $200,000 to $500,000 to provide for works extensions.

NEW YORK.—A charter has been granted to the Saugerties Foundry & Machine Co., capitalized at $20,000. The incorporators are F. C. Smith, E. North and G. W. Levett, 1 West Seventy-second street.

NEW YORK.—Incorporation papers have been issued to the James R. McMann Co., organized with $30,000 capital to manufacture sanitary fixtures and plumbers' supplies. H. E. Mulliken, Englewood, N. J., may be addressed.

NEW YORK.—The Union Gas & Electric Iron Co. has been incorporated with $5000 capital by S. Daniels, 1278 Webster avenue, and others.

NEW YORK.—A charter has been granted to E. R. Senn & Co., capitalized at $50,000, to manufacture lubricating oils, paints, varnishes, etc. Incorporators are E. R. Senn, 972 St. Johns place, Brooklyn, N. Y.; A. H. Greeley Jr., 87 Woodruff avenue, Brooklyn, and others.

NEW YORK.—Work will start soon on a 1-story, 50 x 200-foot factory for the W. P. Tanner-Gross Co., 25 Beaver street, New York. The building will be of brick and steel. The Austin Co., Cleveland, is in charge of the work. The cost of the new structure will be $35,000.

NIAGARA FALLS, N. Y.—The National Carbon Co. has awarded to the Hunkin-Conkey Construction Co., Cleveland, the general contract for the construction of four additions to its Niagara Falls plant. The largest building will be six stories high, 54 x 103 feet. The dimensions of the other buildings are as follows: Two stories, 20 x 114 feet; one story, 70 x 144 feet; one story, 49 x 70 feet.

OLEAN, N. Y.—The board of water supply, through commissioner Sheehan, is receiving bids for a $75,000 filtration plant, to be 1-story, 30 x 70 feet.

PEEKSKILL, N. Y.—A 250-acre site has been purchased on the east bank of the Hudson river by the Weehawken Dry Dock Co. for the establishment of a shipbuilding plant.

TONAWANDA, N. Y.—The United States Alloys Corp. has awarded to the Ferguson Steel & Iron Co. the general contract for the construction of a furnace building.

TUXEDO PARK, N. Y.—The Air-Go Co. has been chartered with $5000 capital to manufacture ventilators, by W. W. Westall, E. A. Farintosh and others.

SYRACUSE, N. Y. — A 2-story factory building to cost $100,000 will be erected by the Crouse-Hinds Co. Gaggin & Gaggin, architects, are drawing plans.

WHITESTONE, N. Y.—The Federal Tool Co. has leased the plant formerly operated by the New York Watering Co., which it will equip for the manufacture of its product.

YONKERS, N. Y.—The Continental Shipbuilding Co., Selah B. Masten, president, has leased a tract of three acres on which it plans to build a fabricating shop and a plant for building wooden ships.

ALIQUIPPA, PA.—The Russell Shovel Co. plans to rebuild its factory which was damaged by fire recently with a loss of $150,000.

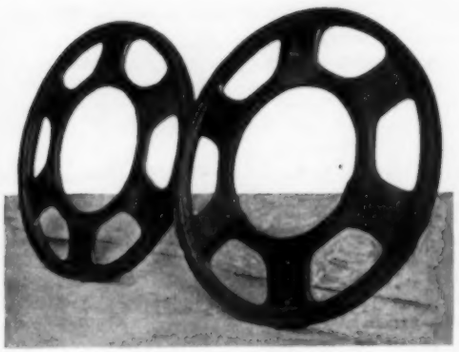
ALLENTOWN, PA.—Harvey Settler, owner of the Adelaide Brass Foundry, 384 Linden street, has bought a site in this city and will build an additional plant.

ALLENTOWN, PA.—The Bethlehem Motors Corp., 40 East Walnut street, is building a 1-story, 80 x 145-foot addition to its plant. The cost of the addition is estimated at $20,000.

BEAVER FALLS, PA.—Carlish & Sharrer, architects, Jenkins arcade, Pittsburgh, have let the contract to P. H. McDanel, New Brighton, Pa., for a $10,000 factory at Beaver Falls, Pa., for the G. H. Hamilton Mfg. Company.

BERWYN, PA. — The American Bronze Corp. is having plans prepared for a 1-story foundry, 83 x 100 feet, to cost $20,000.

BRADFORD, PA. — The Bryant Novelty Co. has been chartered with L. J. Bryant as president and general manager. The company will equip a plant on West Corydon



GEAR BLANKS

Small Steel Castings

plus

Emergency Service!

"Farrell-Cheek" Service has come to be known among foundrymen as ***never failing emergency service.***

When they want ***Small Steel Castings*** and want them ***quick***—"Farrell-Cheek" Service is always specified.

We tolerate no delays—when we accept your order we tell you just when you will get it—AND YOU GET IT!

How do we do it?

We hold 30% of our capacity open for rush work—which enables us to get out rush work without a moment's delay.

We have proved it to hundreds of others. Give us a chance to prove it to YOU.

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"Farrell-Cheek" Quality is guaranteed to be second to none.

When you require

SMALL STEEL CASTINGS

for Tractor Work, Machine Tool Work, Truck Work, etc., or when you wish Blank Gears, or Carbonizing and Case Hardening Boxes, ***let us figure on your requirements.***

Farrell-Cheek Steel Foundry Co.

SANDUSKY, OHIO

BRANCH OFFICES

New York Philadelphia Chicago

street for the manufacture of metal specialties.

CHAMBERSBURG, PA.—Zebriskia, Gamon & Co., 225 Fourth avenue, are having plans prepared by Arch E. Shields, 141 Lincoln Way, for a factory and dye house to cost $18,000.

COATESVILLE, PA.—The roll-turning and punch shops of the Lukens Steel Co. have been severely damaged by fire, with a loss estimated at $30,000.

CONSHOHOCKEN, PA.—Ford & Kendig, 1428 Callowhill street, Philadelphia, are receiving bids on the erection of a 1-story foundry and machine shop which they propose to build. A. E. Wood is president of the company.

CORNWALL, PA. — The Enterprise Mfg. Co. and the Traylor Shipbuilding Corp. have been granted a permit to revise plans for their proposed yard at this point.

CURWENSVILLE, PA.—The Hyde City Nickel Alloy Co. will build a $250,000 addition to its plant this summer.

EAST DOWNINGTOWN, PA.—The Rowe Motor Mfg. Co., Wallace street, will build a 2-story plant, 120 x 200 feet on Fountain avenue, to cost $35,000.

FARRELL, PA.—The American Sheet & Tin Plate Co., Frick building, Pittsburgh, proposes to spend $75,000 for improvements to the annealing plant at its Farrell works.

GREENCASTLE, PA. — The Landis Tool Co. has awarded a contract to Jacob Shank for a fireproof pattern storage plant, 45 x 125 feet in size.

HONESDALE, PA.—The Wayne Engineering Co., capitalized at $35,000, has been chartered and will build an extension to its plant.

LATROBE, PA. — The Peerless Foundry Co. plans to build a $150,000 foundry with power house and warehouse. Address A. L. Francis, general manager, 41 Conestoga building, Pittsburgh.

LEBANON, PA.—The Bethlehem Steel Co. plans to rebuild its coke ovens at the North Lebanon plant.

LOGAN, PA.—The Guyan Machine Shop will purchase considerable additional equipment.

MILLERSBURG, PA.—W. L. Brubaker & Bros., manufacturers of machine tools, have had plans prepared for a 1-story, 75 x 100-foot machine shop.

MOUNT UNION, PA.—The Aetna Explosives Co. will build an addition to its plant, to cost $500,000.

NEVILLE, PA.—The Pittsburgh-DesMoines Steel Co. has bought a tract of land on which it plans to build additions to its plant.

NEW CASTLE, PA.—The Grasselli Chemical Co., Cleveland, will build a $1,000,000 addition to its power plant.

PHILADELPHIA.—The Keystone Supply & Mfg. Co. has awarded the general contract for a 2-story warehouse addition to the Smith-Hardican Co.

PITTSBURGH. — The Ardary-Burns Co., Liberty and Thirty-first streets, has awarded the contract for a 1-story, 48 x 120-foot machine shop to cost about $5000.

SCRANTON, PA.—The plant formerly occupied by the Scranton Axle & Spring Co. has been sold to the Buchanan Foundry Co., Philadelphia, for about $10,000. The Buchanan company, which has plants at Lebanon, Pa., and Waterbury, Conn., makes gray iron castings, and will equip its newly acquired plant for their production.

SHARON, PA.—The Savage Arms Corp. will build an addition to its plant.

SUNBURY, PA.—The Sunbury Converting Works will build a gas plant shortly.

WILSONBURG, PA.—The Peerless Carbon Black Mfg. Co., Pittsburgh, which now operates a plant here, has let the contract for a branch factory at Munroe, La.

TITUSVILLE, PA. — The American Radiator Co. has had plans prepared for a $25,000 plant and has let the contract to the J. W. Cowper Co., Fidelity building, Buffalo.

WAYNESBORO, PA. — The Waynesboro Railway Co. will take bids for a power substation here, to cost about $10,000.

WILLIAMSPORT, PA.—The Williamsport Water Co. proposes to issue bonds for $490,000 to provide for building additions to its plant.

WILLIAMSPORT, PA.—Meredith Hannan, 461 Elmira street, has received the contract for a $10,000 foundry to be built by the National Foundry Mfg. & Supply Co.

CAMDEN, N. J.—J. S. Rodgers, Morristown, N. J., has the general contract for covering several of the shipways at the yard of the New York Shipbuilding Corp. The work is estimated to cost $68,000.

ELIZABETH, N. J.—The D. & D. Machinery & Tool Co. has been organized with $50,000 capital by Otto H. Dissman, Walter Decker and others.

ELIZABETH, N. J.—The New York Drydock & Transportation Co., South Front street, has had plans prepared for a 2-story, 30 x 50-foot addition to its machine shop. A. L. Alpers is secretary and treasurer of the company.

JERSEY CITY, N. J.—The Olive Loading Co. has been chartered to manufacture metal goods with a capital of $500,000. T. A. Gillespie, R. Oliver and T. H. Gillespie, New York, are incorporators.

MADISON, N. J.—The Behre Chemical Works has been incorporated with $50,000 capital to manufacture chemicals. The incorporators are James Benny, Burgess A. Cruden and others, Bayonne, N. J.

MORGAN, N. J.—The T. A. Gillespie Co., 50 Church street, New York, plans to build a shell-loading plant here. New equipment required will include cranes, hoists and machine tools.

NEWARK, N. J.—The City Auto Radiator Co. has been incorporated with $10,000 capital by Samuel Zucker and others.

NEWARK, N. J. — The Hartwell-Rademaekers Mfg. Co. has been chartered with $150,000 capital to manufacture dynamos and motors. William A. Rademaekers, A. E. Hartwell and W. H. Rademaekers Jr., New York, are incorporators.

NEWARK, N. J.—The Liberty Machine Tool & Die Co. has been chartered with $80,000 to manufacture tools. Albert W. Wenzel, Charles L. Barrows, Newark, and others are the incorporators.

NEWARK, N. J.—A. J. Hastings & Co. have been chartered with $3000 capital to manufacture saws. The incorporators are Arthur C. Hastings, Newark, and Victor E. H. Hoagland, East Orange, N. J.

NEWARK, N. J.—The Ford Motor Co., it is reported, will erect a shipbuilding plant on the meadows near here for the construction of U-boat destroyers. The plant will be a duplicate of the River Rouge plant, near Detroit, and will employ between 10,000 and 15,000 men.

PATERSON, N. J.—Seven warehouses, costing in all $2,000,000, will be erected here by the army quartermasters department. It is stated that estimates on construction have already been asked, and that the buildings will be completed within 30 days, after work is begun.

PHILADELPHIA.—The Massoth Packer & Machine Co. has been chartered with $50,000 capital to manufacture tools by L. K. Cornelius.

SOUTH ORANGE, N. J.—The Peerless Watchman's Clock Co. has been chartered with $75,000 capital. The incorporators are E. L. Prior, Maplewood, N. J.; W. M. Vinnedge, Brooklyn, N. Y., and H. T. Stetson, Orange, N. J.

TRENTON, N. J.—J. O. Hunt, 114 North Montgomery street, has prepared plans for a new plant to be built by the John E. Thropp's Sons Co. to comprise a foundry, 100 x 360 feet, a new power house, pattern shop, pattern storage building, and railroad sidings, to cost in all about $100,000.

WILMINGTON, DEL.—Bids will be received about April 15 for the construction of the proposed $10,000,000 plant to be erected by the Wilmington Sugar Refining Co.

CURTIS BAY, MD.—The Maryland Bolt Co. will build a $100,000 addition to its plant.

Activities in the Central States

ALGOMA, WIS.—Moses Shaw, consulting engineer, has been engaged to prepare plans for a new reinforced concrete and steel bridge over the Ahnapee river, to consist of four 40-foot deck girder spans.

BERLIN, WIS.—Metzig Bros. have disposed of their blacksmith shop but will continue their machine shop business, adding a complete welding and cutting shop and installing several new machines.

CAMPBELLSPORT, WIS.—Jerry Donohue, consulting engineer, York building, Sheboygan, Wis., is preparing plans for improvements and extensions to the city waterworks and sewage system estimated to cost $50,000. A new 70-foot steel stand pipe of about 100,000 gallons capacity is contemplated.

CLINTONVILLE, WIS.—Work is now under way on the construction of a new concret edam and power house for the new hydroelectric plant which is being built on the Embarrass river by the Topp-Stewart Tractor Co. for the operation of its new farm tractor plant, completed recently. The new power plant will consist of a 210-foot dam, 30 feet high, and a power house. The generator will have a capacity of 750 kilowatts and provision is being made for the addition of a unit of the same size when a greater output is needed.

CUDAHY, WIS. — Another large addition

Modern Carriers

Our great West 60 years ago is duplicated in a dozen different countries today. And just as our land developed and grew so will these great stretches of virgin territory. After the war is over railroads will be built to bring out the wealth of these countries to a needy world, but until that time comes freight traffic must be conducted by prairie schooners, veldt kaarts and arcos, just as we did two generations back.

It is vital to the success of the American export trade that our goods be safely delivered to the present buyers in these countries. These lands will be great and populous, and the American products that give satisfaction now will hold a permanent trade in the future. Goods that are improperly packed, that come to the buyer broken, mouldy from dampness, or riddled by weevils won't develop this export trade.

There is a right way to pack for export, and the export merchant knows and specifies these requirements. To the manufacturer it may seem that his demands are excessive, but he knows what each packing case must withstand to reach its destination safely. Our little booklet, "Export Packing," explains these conditions. It will be sent to any manufacturer on request.

FEDERAL EXPORT CORPORATION

115 Broadway New York

to the plant of the Ladish Drop Forge Co. will be erected at once to provide for handling existing contracts. The new shop, designed by Klug & Smith, consulting engineers, Milwaukee, will be 50 x 250 feet, of steel, reinforced concrete and brick, and will cost about $30,000 with equipment.

FRIENDSHIP, WIS.—A. J. Kramp, Berlin, Wis., has been awarded contracts for erecting five concrete and steel highway bridges in Adams county. F. F. Mengel is county highway commissioner.

GREEN BAY, WIS.—Architect C. W. Williams, Parmentier building, is preparing plans for a 2-story concrete, steel and brick machine shop addition for the Hudson & Sharp Machine Co., 1207 Main street. It will be 35 x 110 feet, and will cost about $15,000, exclusive of equipment.

HARTFORD, WIS.—The Kissel Motor Car Co. has awarded the general contract for the erection of two new factory buildings, 40 x 200 and 40 x 100 feet, to Thom Bros., Hartford. The Kissel company will spend about $40,000 in new buildings and equipment to handle a large contract for army trucks for the government.

MILWAUKEE.—The department of public works is taking bids until March 22 for the reconstruction of the Humboldt avenue bridge over the Milwaukee river.

MILWAUKEE.—The Babcock Automobile Spring Co., 192 Milwaukee street, manufacturer of vehicle springs, has broken ground for a new plant on Jefferson street. The building will be three stories, 60 x 127 feet, of reinforced concrete and brick, and will cost about $35,000 when equipped.

MILWAUKEE.—The Res Mfg. Co., 2907-2909 Meinecke avenue, has awarded the general contract for the erection of a 2-story addition, 67 x 75 feet, to J. D. Morrison, West Allis, Wis. The company manufactures hardware specialties. Arthur J. Buckley is president.

MILWAUKEE. — The Milwaukee-Western Fuel Co., 14 Grand avenue, has awarded to the Frank Luenzmann Co., 1912 Prairie street, the general contract for constructing 600 feet of coal hoppers at Fifteenth and Canal streets. Klug & Smith, Mack block, are consulting engineers. The work will cost about $35,000.

MILWAUKEE.—A fire which swept the coal yards of the Kanawha Fuel Co., March 10, damaged the hoisting and screening equipment so that it will have to be replaced.

OSHKOSH, WIS.—The Router Mfg. Co. has been incorporated with a capital of $25,000 to manufacture metal-working tools and hardware specialties. James C. Casey is in charge.

OSHKOSH, WIS.—The Universal Foundry Co., which recently increased its capital from $10,000 to $25,000, plans to install additional equipment. The company manufactures gray iron castings.

PORT WASHINGTON, WIS.—The Turner Mfg. Co., which recently increased its capital stock from $100,000 to $250,000, contemplates the erection of a large factory addition to house its tractor department.

SUPERIOR, WIS. — A permit has been granted to the Superior Iron Works, Third street and Grand avenue, for the erection of a new boiler shop, to be two stories high and 60 x 96 feet in size. Cost is estimated at $5000. Frank Hayes is president of the company.

WATERTOWN, WIS.—The Monarch Tractor Co. is having plans prepared for an addition to the machine shop and assembling about $20,000. W. H. Stiemke is manager. room of its plant. The investment will be

WEST BEND, WIS.—The common council has authorized a bond issue of $10,000 for the construction of a reinforced concrete bridge over the Milwaukee river and the mill-race on Division street. An engineer will be selected at once.

WINTER, WIS.—The Kelsey-Brewer Co., Grand Rapids, Mich., has engaged L. A. DeGuere, consulting engineer, Grand Rapids, Wis., to prepare plans for a new concrete dam, 110 feet long and 40 feet high, containing three steel gates, and for other improvements at its hydro-electric power plant on the Thornapple river.

DETROIT.—The foundry of the Monarch Steel Castings Co., Solvay avenue and the Wabash railway, has been severely damaged by fire, with a loss estimated at $100,000. Phillip H. McMillan is general manager of the company.

GALESBURG, MICH.—A charter of incorporation has been granted to the Galesburg Foundry & Castings Co., capitalized at $5000.

CHICAGO.—A permit has been granted to G. A. Buehl, 3950 West Fillmore street, for the erection of a 1-story brick boiler house to cost $2000.

CHICAGO.—The A. Nelson Mfg. Co. has obtained a permit to build a machine shop on Southport avenue

CHICAGO.—The Security Tool Works has increased its capital from $20,000 to $35,000 to provide for building extensions to its plant.

CHICAGO.—The William Ganschow Co., gear cutter, has purchased a site on Morgan street on which it plans to build an addition to its plant, located nearby.

CHICAGO HEIGHTS, ILL.—The Indiana Car Works, it is reported, has purchased the Hicks Car Works, and will enlarge and build additions to the plant.

DE PUE, ILL.—The east unit of the ore crusher at the plant of the Mineral Point Zinc Co. has been damaged by fire, entailing a loss of $15,000. An elevator, a number of belts and some machinery will have to be replaced.

EAST ST. LOUIS, ILL.—The Lubrite Refining Co. has purchased a tract of 25 acres on which it plans to build a plant for the production of airplane lubricants. W. S. Strickler is president of the company.

OTTAWA, ILL.—The factory of the Ottawa Pianophone Co. has been damaged by fire with a loss estimated at $100,000.

PEORIA, ILL.—The Lawler Tank Heater Co. has been granted a charter of incorporation with a capital of $100,000, and will build a plant. S. B. Adelman, F. E. Mendenhall and L. Adelman are the incorporators.

PEORIA, ILL.—The Maple City Stamping Works, Monmouth, Ill., plans to remove its plant to Peoria.

ROCKFORD, ILL. — The Rockford Tool Co. has increased its capital stock from $10,000 to $150,000 to provide for building extensions to its plant.

AKRON, O.—Preliminary plans have been drawn for a 1-story factory building 60 x 100 feet, to be built by the Akron Standard Mold Co., at a cost of approximately $35,000. C. W. McLaughlin is president of the company.

AKRON, O.—The plant of the Williams Foundry & Machine Co. has been damaged by fire with a loss of $10,000. The plant has been working to capacity on government orders.

ALLIANCE, O. — The Alliance Auto & Tool Co. has been chartered with $20,000 capital. The incorporators are J. A. McCaffery, George W. Fertin, Charles S. Luce and others.

BUCYRUS, O.—The American Clay Machinery Co. is in the market for shell making equipment, including ten 24-inch lathes and 12 grinding machines.

CANTON, O.—The Eclipse Electric Co. has been granted a charter of incorporation with a capital of $10,000. The incorporators are Charles A. Miller and N. W. Wirth.

CARTHAGE, O.—The large addition to the plant of the Pollak Steel Co., to cost $500,000, will be started in a few weeks. The plant will be devoted entirely to the execution of contracts for the navy.

CINCINNATI.—The Willard Press & Tool Co. has been chartered with $10,000 capital by Thomas L. Bratton, George W. Schaefer, Ernst Richter and others.

CINCINNATI. — The Warman Aluminum Casting Co., 1741 Central avenue, contemplates equipping its plant for the production of brass castings. The company has been incorporated recently with $20,000 capital. Roy Warman is president.

CINCINNATI.—The Fening-Stockman Iron Works Co. has been incorporated with $25,000 capital by Henry Fening, Fred Stockman and E. C. Lamb.

COLUMBUS, O.—The Ohio State Stove Co. has increased its capital from $75,000 to $250,000 to provide for expansion of its plant.

COLUMBUS, O.—The Ohio Malleable Iron Co. plans to make extensive alterations to its plant, including the installation of three gantry cranes, and other labor-saving devices. The company manufactures steel buckets, motor truck castings and malleable chain.

COLUMBUS, O.—Richard Dawson, architect, Hartman building, is receiving bids on the construction of a 3-story building, 40 x 63 feet, to be built for the Atlas Brass Foundry Co., 980 South Park street. Cost of the new building is estimated at $15,000. John Whittman is president of the company.

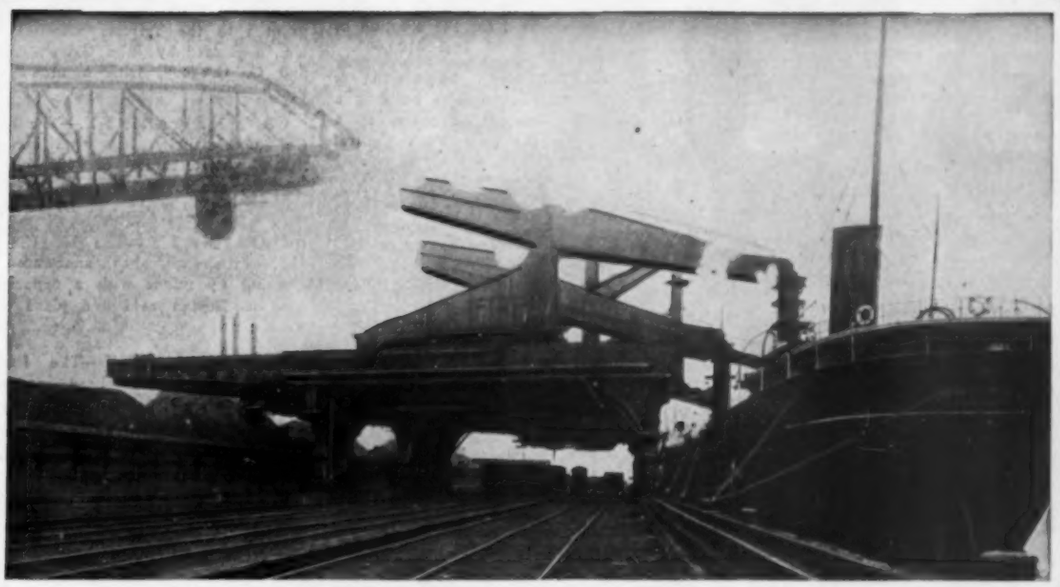
CLEVELAND. — The Standard Pressed Steel Co. has been organized with $25,000 capital by Joseph J. Boehm, Andrew J. Miller and others.

CLEVELAND. — The Flexible Steel Tire Co. has been incorporated with $5000 capital by G. O. Bell and John Keavey.

CLEVELAND.—A charter of incorporation has been granted to the Fisher Chemical Co., capitalized at $50,000. The incorporators are Louis Fisher and H. E. Varga.

CLEVELAND. — The Ferry Cap & Set Screw Co. has increased its capital stock from $500,000 to $1,000,000 to provide for plant extensions.

CLEVELAND.—The General Chemical Co. has awarded to the A. A. Lane Construction



Steel Giants Do Work of Thousands of Men

All of the large modern ore docks constructed during the last six years have been equipped with **Hulett Boat Unloaders.** These machines have become a standard for unloading Iron Ore, and ***they are equally well adapted for unloading Coal.***

Hulett Unloaders are built in the following sizes and guaranteed capacities: **For Ore:** *17-Ton Buckets*, capacity 1,250,000 tons per season; *15-Ton Buckets*, capacity 1,000,000 tons per season; *10-Ton Buckets*, capacity 750,000 tons per season. **For Coal:** *8-Ton Buckets*, capacity 500,000 tons per season.

Hulett Unloaders require (1) fewest number of men, (2) lowest labor cost per ton, (3) lowest power cost per ton, (4) lowest maintenance cost per ton.

Complete Ore and Coal Handling Stations, equipped with Boat Unloaders, Car Dumpers, Rehandling Bridges, etc., are a specialty of The W-S-M Company.

Bulletins are in preparation on Ore and Coal Handling Machinery. *Send for your copies.*

The four Unloaders pictured above constitute the Pennsylvania Railway's Whisky Island installation at Cleveland, Ohio.

Principal Products of The W-S-M Company
Steel Plant Equipment:
Manipulators, Furnaces, Charging Machines, etc.
By-Product Coke Oven Machinery.
Shipyard Cranes.
Hoisting and Mining Machinery.
Ore and Coal Handling Machinery.
Special Large Cranes.
Gas Producers, Gas Valves.
Hydraulic Turbines.
Johnson Hydraulic Valves.
Steel Castings.

WELLMAN SEAVER MORGAN COMPANY
CLEVELAND
OHIO U.S.A.

Say you saw it in THE IRON TRADE REVIEW

Co., 1836 Euclid avenue, the contract for the erection at Willow station, of two plant additions to cost $20,000.

CLEVELAND.—The Gebauer Chemical Co., 523 Erie building, plans to build a factory at Union avenue and East Ninety-third street, to be of brick and reinforced concrete construction. Plans are being drawn by R. H. Hinsdale, architect, Erie building. The building will cost about $10,000.

CLEVELAND. — Condemnation proceedings will start shortly involving a site, 500 x 600 feet, adjoining the Kirtland street pumping station, on which the city plans to build a waterworks addition.

CLEVELAND.—Bids will be received shortly by David Katz, 2330 East Thirty-seventh street, for a building to be used for light manufacturing. The structure will be two stories high and 40 x 90 feet, and will cost about $25,000.

CLEVELAND.—Contract has been awarded by the D. Connelly Boiler Co. to W. I. Thompson & Son, contractors, for a 1-story boiler shop 80 x 140 feet, which it will erect at Ivanhoe road and the Nickel Plate railroad. The building will cost about $18,000.

CLEVELAND.—The Acme Mill Supply Co. has been incorporated with a capital of $10,000 by A. E. Demilio, Mark L. Fisher, Morris Becker and others.

CLEVELAND.—The Cleveland Tractor Co. has awarded the contract for the first unit of its plant to be built on Euclid avenue. This unit will be 180 x 440 feet in size and will cost about $250,000.

DAYTON, O.—The National Cash Register Co. has had plans prepared for the erection of a 1-story factory building to cost $100,000.

LORAIN, O.—The Detroit Engineering & Foundry Co., Detroit, contemplates building a plant here, and has obtained an option on a tract of 20 acres on the New York Central railroad.

NEWARK, O.—The Blair Motor Truck Co. will build an addition to its plant.

RAVENNA, O.—The John F. Byers Machine Co. has increased its capital stock from $150,000 to $300,000.

SANDUSKY, O.—The Ohio Tread & Tire Co. will start work shortly on the erection of a factory building. F. Haskell Smith is general superintendent of the company.

SPRINGFIELD, O.—The Superior Gas Engine Co. plans to build a 60 x 160-foot addition to its plant, two stories, of reinforced concrete construction. The addition will be equipped for a machine shop.

TIFFIN, O.—The Hanson Clutch & Machinery Co. will start work shortly on the erection of two new factory buildings for the manufacture of friction clutches. M. B. Hanson is in charge.

YOUNGSTOWN, O.—The American Sintering Co., C. B. Kelley, Stambaugh building, manager, will take bids after March 20 on the construction of an addition to its sintering plant which was damaged by fire a few months ago. Cost of the proposed structure will be about $100,000.

COVINGTON, KY.—A charter has been granted to the Tristate Metal Weather Strip Co., organized by John Gaiser, L. B. Simpson and C. Gregory, with a nominal capital of $1000.

GRAND RIVERS, KY.—The Suwanee Iron Co. of Kentucky, has been incorporated recently with a capital of $500,000. The incorporators are J. M. Overton, president of the company, C. Cooper and D. I. Miller.

HARLAN, KY.—The H. C. Frick Coke Co., Pittsburgh, has announced plans for opening up mines with a capacity of 12,000 tons in Harlan field and plans extensive developments.

LOUISVILLE, KY.—The Louisville Machine Mfg. Co. has been incorporated with $150,000 capital; by Arthur L. Keim, Paul F. Loichot, Archibald Rogers and others.

MADISONVILLE, KY.—The St. Bernard Mining Co. will rebuild its power plant at Shamrock mine, which was recently dynamited. Loss was about $40,000.

OWENSBORO, KY.—The Anglo-American Mill Co., operator of a foundry and manufacturer of milling machinery, has in- 000 to provide for plant expansion. creased its capital from $1,000,000 to $1,250,-

WINDSOR, W. VA.—The American Gas & Electric Co. will build a large addition to its plant this spring.

New Business in Eastern Canada

BROCKVILLE, ONT.—The Canada Carriage Factories, Ltd., will build an addition to its factory to cost $40,000.

OTTAWA, ONT.—The Colonial Hide Co. will build a tannery on Hurdman's road, to cost about $40,000.

OTTAWA, ONT.—McDougal Bros., Messerer street, are in the market for t wo locomotives, fifteen 4-yard dump cars, one traveling derrick and 75 tons of relaying rails.

TILSONBURG, ONT.—The Huntley Mfg. Co. whose plant was severely damaged by fire recently, with a loss of $100,000, will rebuild immediately and will require machinery and equipment.

TORONTO, ONT. — The Nipigon Reserve Iron Co., Ltd., has been incorporated to carry on a general mining business and to manufacture and treat iron, steel, ores and minerals, with $375,000 capital stock. John W. Newcombe, Fort William, Ont.; Frank E. Abbott, 169 College street, Toronto; James R. L. Starr and others are incorporators.

TORONTO, ONT .— The Commercial Acetylene Supply Co., a New Jersey corporation, has been chartered to manufacture machinery and appliances for railroad lighting systems, with $50,000 capital stock. William H. Wood, 6 Stonehouse Crescent, Toronto, Ont., is the representative of the company.

GRAND MERE, QUE.—The Laurentide Co., McGibbon and Third avenues, will build an addition to its plant, to cost $150,000. Elwood Wilson is chairman.

HULL, QUE.—Bids are being received by Millson & Burgess, Union Bank building, Ottawa, Ont., for the erection of a 1-story machine shop for the Hull Iron & Steel Works.

MONTREAL, QUE.—Williams & Williams tos & Chrome Mines Ltd. are in the market for a lift centrifugal pump. M. A. Sammett, room 504, McGill building, Montreal, is the consulting engineer in charge.

MONTREAL, QUE.—Bids have been received for a 4-story factory, to be erected for the Canada Castings Co., 750 St. Paul street west, and estimated to cost $75,000. Hutchison, Wood & Miller, 2 Place D' Armes, Montreal, are the architects.

MONTREAL, QUE.—The Phillips Steel & Wire Co. Ltd. has been incorporated to manufacture wire and machinery with $100,- 000 capital stock. Maurice Alexander, Aubrey H. Elder, Felix W. Hackett and others are interested.

MONTREAL, QUE.—Williams & Williams Ltd. have been incorporated to manufacture machinery and hardware supplies with $500,- 000 capital stock. Michael B. Bronstetter, Walter E. Richardson, Keith C. Notman and others are the incorporators.

MONTREAL, QUE.—The Tollard Mfg. Co. Ltd. has been incorporated to manufacture machinery and tools with $50,000 capital stock. Waldo W. Skinner, William G. Pugsley, Gordon G. Hyde and others are interested.

MONTREAL, QUE.—The American Electro Products Co., Ltd., has been incorporated to manufacture electrical equipment and machinery with $1,500,000 capital. L. Macfarlane, W. B. Scott, J. MacNaughton and others are incorporators.

MONTREAL, QUE.—The Federal Zinc & Lead Co. Ltd. has been incorporated to develop lead, zinc and copper mines with $3,- 000,000 capital. M. M. A. Plimsoll, R. Brodeur, H. Langevin and others are incorporators.

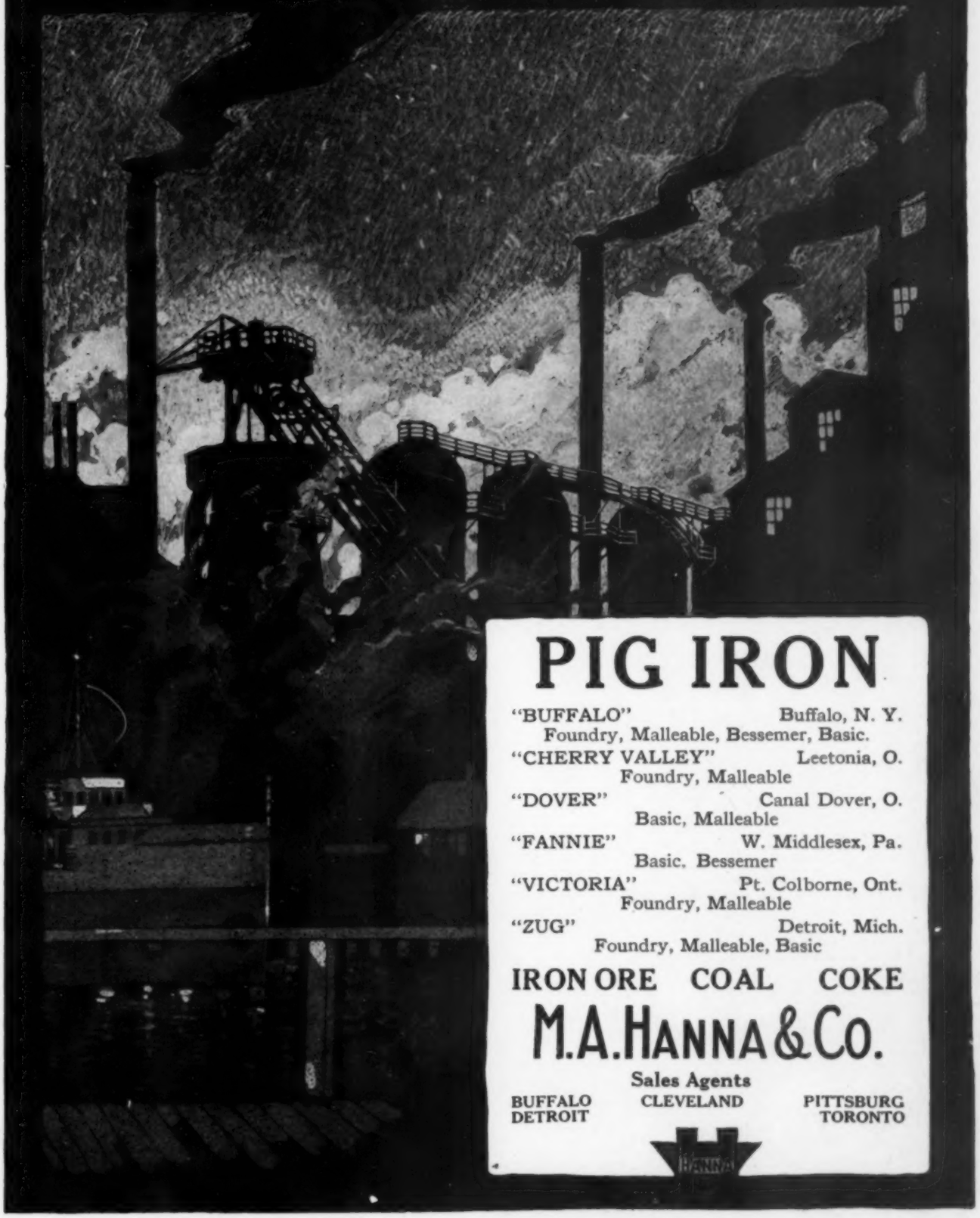
SHAWINIGAN FALLS, QUE. — The Church-Ross Co., Ltd., 40 Hospital street, Montreal, Que., have been awarded the general contract for the erection of a plant for the American Products Co., to cost $1,- 800,000.

SHERBROOKE, QUE.—The Auto Piston Ring Co. Ltd. has been incorporated to manufacture automobile piston rings with a capital stock of $149,000. M. Standish, O. B. Somerworth, A. Graham and others are incorporators.

THREE RIVERS, QUE.—The Page Wire Fence Co. of Canada, Walkerville, Ont., will start work shortly on the erection of a manufacturing plant at Three Rivers to cost $150,- 000, and will require machinery and equipment.

WINNIPEG, MAN.—The Magnet Metal & Foundry Co., Ltd., has been incorporated to carry on a general foundry and machine shop business, and to manufacture iron and steel products, with $150,000 capital stock. J. B. Coyne, S. F. Moffatt, F. K. Hamilton and others are interested.

HANNA



PIG IRON

"BUFFALO" Buffalo, N. Y.
Foundry, Malleable, Bessemer, Basic.

"CHERRY VALLEY" Leetonia, O.
Foundry, Malleable

"DOVER" Canal Dover, O.
Basic, Malleable

"FANNIE" W. Middlesex, Pa.
Basic. Bessemer

"VICTORIA" Pt. Colborne, Ont.
Foundry, Malleable

"ZUG" Detroit, Mich.
Foundry, Malleable, Basic

IRON ORE COAL COKE

M. A. HANNA & CO.

Sales Agents

BUFFALO CLEVELAND PITTSBURG
DETROIT TORONTO

Say you saw it in THE IRON TRADE REVIEW

Iron and Steel Prices

Corrected to Tuesday Noon

IRON ORE

Superior Ores, Per Ton, Lower Lake Ports

Old range Bessemer, 55 iron	$5.95
Mesabi Bessemer, 55 iron	5.70
Old range non-Bess., 51½ iron	5.20
Mesabi non-Bess., 51½ iron	5.05

WAREHOUSE PRICES

Steel bars, Chicago	4.10c
Steel bars, Cleveland	4.035c
Steel bars, Detroit	4.085c
Steel bars, Philadelphia	4.10c
Steel bars, New York	4.095c
Steel bars, St. Louis	4.17c
Steel bars, Cincinnati	4.085c
Steel bars, St. Paul	4.22c
Steel bars, Buffalo	4.05c
Iron bars, Buffalo	4.65c
Iron bars, Chicago	4.10c
Iron bars, Cleveland	3.985c
Iron bars, Detroit	4.75c
Iron bars, St. Louis	4.17c
Iron bars, Cincinnati	4.085c
Iron bars, Philadelphia	4.50c
Iron bars, New York	4.659c
Shapes, Chicago	4.20c
Shapes, Detroit	4.185c
Shapes, St. Louis	4.27c
Shapes, St. Paul	4.32c
Shapes, New York	4.195c
Shapes, Cleveland	4.135c
Shapes, Philadelphia	4.20c
Shapes, Buffalo	4.15c
Shapes, Cincinnati	4.185c
Plates, Buffalo	4.40c
Plates, Chicago	4.45c
Plates, Detroit	4.435c
Plates, St. Louis	4.52c
Plates, St. Paul	4.57c
Plates, New York	4.445c
Plates, Cleveland	4.385c
Plates, Philadelphia	4.45c
Plates, Cincinnati	4.435c
No. 10 blue anl. sheets, Chi.	5.45c
No. 10 blue anl. sheets, Cleve.	5.385c
No. 10 blue anl., Buffalo	5.40c
No. 10 blue anl., sheets, St. L.	5.52c
No. 10 blue anl. sheets, Cinci.	5.435c
No. 10 blue anl. sheets, St. Paul	5.57c
No. 10 blue anl. sh., Detroit	5.435c
No. 28 black sheets, Chgo.	6.45c
No. 28 black sheets, Cleve.	6.385c
No. 28 black sheets, Cinci.	5.45c
No. 28 black, Detroit	6.435c
No. 28 black sheets, St. L.	6.52c
No. 28 black sheets, St. Paul	6.57c
No. 28 galv. sheets, Chgo.	7.70c
No. 28 galv. sheets, Cleve.	7.635c
No. 28 galv. sheets, Cinci.	6.635c
No. 28 galvanized, Detroit	7.685c
No. 28 galv. sheets, St. L.	7.77c
Hoops, Cleveland	4.885c
Hoops, Detroit	4.935c

IRON AND STEEL SCRAP

STEEL WORKS USE

(Gross Tons)

Bundled sheets, Pittsburgh	$22.00 to 23.00
Bundled sheets, Cleveland	24.50 to 25.25
Bundled sheets, Buffalo	22.00 to 24.00
Boiler plate, cut, No. 1 Chgo.	24.50 to 25.50
City wrought, short, N. Y.	26.75
Frogs, switches, guards, St. L.	29.50 to 30.00
Frogs, switches, guards, Chgo.	30.00
Heavy melting steel, Pitts.	30.00
Heavy melting steel, Buffalo	30.00
Heavy melting steel, Chgo.	30.00
Heavy melt'g steel, Cleveland	30.00
Heavy melting steel, Cinci.	27.00 to 27.50
Heavy melt'g steel, east. Pa.	28.50 to 29.50
Heavy melting steel, N. Y.	26.75
Heavy melting steel, St. L.	29.50 to 30.00
Heavy melting steel, Birming.	25.00 to 26.00
Hydraulic press. sheets, Cleve.	29.50 to 30.00
Hydraulic press. sheets, Pitts.	27.00 to 28.00
Hydraulic press. sheets, Chgo.	27.00 to 27.50
Knuckles, couplers, Chgo.	35.00
Low phos. steel, Buffalo	40.00
Low phos. steel, Pittsburgh	40.00
Low phos. steel, eastern Pa.	37.50
Shoveling steel, Chicago	30.00
Shoveling steel, St. Louis	29.50 to 30.00
Springs, Chgo.	35.00
Steel rails, short, Chicago	34.50 to 35.00
Steel rails, short, Cleveland	35.00
Steel rails, short, St. Louis	34.00 to 35.00
Steel rails, old, Birmingham	28.00 to 30.00
Stove plate, Chgo.	25.50 to 26.50
Stove plate, Cincinnati	20.00 to 20.50
Stove plate, St. Louis	20.50 to 21.00
Stove plate, N. J. points	22.75
Stove plate, Birmingham	18.00 to 21.50
Stove plate, Buffalo	25.00
Stove plate, eastern Pa.	23.00 to 24.00
Stove plate, Cleveland	28.50
Stove plate, Pittsburgh	20.00 to 21.00

(Net Tons)

Boiler plate, cut, No. 1, St. L.	24.50 to 25.00
Bundled sheets, Cincinnati	20.00 to 20.50
Knuckles, coup., St. Louis	31.00 to 31.25

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:

Cleveland	$0.95
Newark, N. J.	3.50
Boston	3.70
Philadelphia	3.30
Pittsburgh	.95
St. Louis	3.18
Minneapolis, St. Paul	4.54

Buffalo to:

Albany, N. Y.	$1.26
New England (rail)	3.10
New York and Brooklyn (rail)	3.10

Virginia furnaces to:

Philadelphia	$3.27
New England	3.77
Brooklyn, Jersey City, Newark	3.52

Birmingham, Ala., to:

Boston	6.00
Cincinnati	2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (r. and w.)	6.00
Philadelphia (r. and w.)	5.25
Pittsburgh	4.90
Savannah, Ga.	2.75
St. Louis	3.40

Chicago to:

Des Moines	$2.80
Milwaukee	.50
Minneapolis, St. Paul	2.00
Moline, Ill.	1.15
Omaha	3.58
St. Louis	1.58

Ironton and Jackson, O., to:

Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58
Minneapolis, St. Paul	4.54

Duluth, Minn., to:

Minneapolis- St. Paul	$1.25

Mayville, Wis.:

Minneapolis-St. Paul	$1.75

Freight Rates, Finished Material

Pittsburgh, carloads, per 100 lbs., to:

New York	19.5 cents
Philadelphia	18.5 cents
Boston	21.5 cents
Buffalo	16.0 cents
Baltimore	18.0 cents
Cleveland	13.5 cents
Cincinnati	17.0 cents
Chicago	21.5 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	82.5 cents
St. Louis	27.0 cents
New Orleans	30.0 cents
Birmingham	45.0 cents
Pacific coast (all rail)	75.0 cents
Pacific coast (tin plate)	75.0 cents

IRON MILL USE

(Gross Tons)

Angle bars, iron, Chgo.	40.00
Arch bars, transoms, Chgo.	47.50
Busheling, No. 1, Cleveland.	32.00
Busheling, No. 1, Buffalo	30.00 to 31.00
Busheling, No. 2, Buffalo	22.00 to 24.00
Busheling, No. 1, Pittsburgh	32.00
Busheling, No. 1, Chgo.	29.50 to 30.00
Busheling, No. 2, Chgo.	20.25 to 21.25
Cast borings, New York	17.00
Cast borings, eastern Pa.	19.00 to 20.00
Cast borings, Cleveland	20.00
Cast borings, Buffalo	19.00 to 20.00
Cast borings, Pittsburgh	20.00
Cast borings, Birmingham	13.00 to 15.00
Cast borings, Chgo.	18.50 to 19.00
City wrought, long, N. Y.	31.50
Cut forge, Chicago	32.75 to 33.25
Forge flashings, small, Cleve.	28.00 to 28.50
Forge flashings, large, Cleve.	28.00 to 28.50
Forge No. 1, eastern Pa.	26.50 to 27.50
Grate bars, Buffalo	25.00
Grate bars, Cleveland	21.50 to 22.50
Grate bars, N. J. points	22.75
Iron axles, Pittsburgh	42.00 to 44.00
Iron axles, Cincinnati	44.00 to 44.50
Iron axles, Cleveland	47.50
Iron axles, eastern Pa.	47.50
Iron axles, Chicago	47.50
Iron axles, Buffalo	45.00 to 47.00
Iron rails, Chicago	39.00 to 40.00
Iron rails, Buffalo	37.00 to 38.00
Iron rails, Cincinnati	33.00 to 33.50
Iron rails, St. Louis	34.00 to 35.00
Iron rails, Cleveland	35.00
Machine turnings, Cleve.	18.25
Machine turnings, Buffalo	18.00 to 18.50
Machine turnings, N. Y.	16.50
Machine turnings, Pitts.	20.00
Machine turnings, east. Pa.	18.50 to 19.50
Machine turnings, Birming.	17.50 to 19.00
Machine turnings, Chicago	18.50 to 19.00
Pipes and flues, Cleveland	25.50 to 26.50
Pipes and flues, Chicago	26.50 to 27.50
R. R. mch. cast, No. 1, Buff.	35.00
R. R. wrgt. No. 1, Buffalo	35.00
R. R. wrgt., No. 1, east, Pa.	35.00
Railroad wrgt., No. 1, Cleve.	35.00
R. R. wrought, No. 1, Pitts.	35.00
Railroad wr'ght, No. 1, Chgo.	35.00
Railroad wr'ght, No. 2, Chgo.	33.50 to 34.50
R. R. wrgt. No. 1, Birming.	27.50 to 29.00
Wrought pipe, Buffalo	28.00 to 29.00
Wrought pipe, eastern Pa.	33.00 to 34.00
Wrought pipe, ungraded, eastern Pa.	30.00

(Net Tons)

Angle bars, steel, St. Louis	34.50 to 35.00
Arch bars & transoms, St. L.	42.00 to 42.50
Busheling, No. 1, Cincinnati	24.00 to 24.50
Busheling, No. 1, St. Louis	26.50 to 27.00
Cast borings, Cincinnati	15.50 to 16.00
Cast borings, St. Louis	17.00 to 17.50
Iron axles, St. Louis	42.00 to 42.50
Machine turnings, Cinci.	15.50 to 16.00
Machine turnings, St. L.	17.50 to 17.85
Pipes and flues, St. Louis	26.25 to 26.75
Railroad wrgt., No. 1, Cinci.	30.00 to 30.50
Railroad wrgt., No. 1, St. L.	31.00 to 31.25
Railroad wrgt., No. 2, St. L.	30.00 to 30.40

IRON OR STEEL WORKS USE

(Gross Tons)

Axle turnings, Cleveland	$24.00 to 25.00
Axle turnings, Buffalo	25.00
Shafting, New York	36.50
Shafting, eastern Pa.	40.00
Steel car axles, Birmingham	32.00 to 33.00
Steel car axles, New York	45.50 to 46.00
Steel car axles, Buffalo	45.00 to 47.00
Steel car axles, Cleveland	45.00
Steel car axles, Pittsburgh	40.00 to 42.00
Steel car axles, eastern Pa.	47.50
Steel car axles, Chgo.	47.50

(Net Tons)

Shafting, St. Louis	42.00 to 42.50
Steel car axles, St. Louis	42.00 to 42.50

IRON FOUNDRY USE

(Gross Tons)

Car wheels, (iron), Pitts.	$30.00
Car wheels, (steel), Pitts.	33.00 to 35.00
Car wheels, eastern Pa.	30.00
Car wheels, Buffalo	30.00
Car wheels, Chicago	30.00
Car wheels, St. Louis	29.50 to 30.00
Car wheels, Birmingham	25.00 to 30.00
Car wheels, Cleveland	30.00
Tram car wheels, Birming.	21.00 to 25.00
Cast, No. 1 cupola east. Pa.	33.00
Cast, No. 1, Birmingham	25.00 to 26.00
Cast No. 1, Cleveland	33.75
Cast, 1, heavy, N. J. points	33.25 to 33.75
Cast, 1, machy., N. J. points	33.25 to 33.75
Cast No. 1, Chicago	33.00 to 34.00
Cast, No. 1, Pittsburgh	28.00 to 29.00
Malleable, Cincinnati	30.00 to 35.00
Malleable, Cleveland	30.00 to 35.00
Malleable, Buffalo	30.00 to 35.00
Malleable, Pittsburgh	30.00 to 35.00
Malleable, east. Pa.	30.00 to 35.00
Malleable railroad, Chgo.	33.00 to 34.00
Malleable, agricultural, Chgo.	33.00 to 34.00

(Net Tons)

Cast, No. 1, Cincinnati	26.00 to 26.50
Cast, No. 1, St. Louis	26.50 to 27.00
Malleable railroad, St. Louis	26.25 to 26.75
Malleable agricultural, St. L.	26.50 to 26.75

MISCELLANEOUS USES

(Gross Tons)

Boiler punchings, Chgo.	36.50 to 37.50
Reroll. rails, 5 ft. & ov., Pitts.	35.00
Reroll. rails, 5 ft. & ov., Chgo.	35.00
Reroll. rails, 5 ft. & ov., E. Pa.	35.00
Reroll. rails, 5 ft. & ov., St. L.	34.00 to 35.00
Reroll. rails, 5 ft. or over, Cleve.	33.00
Rerolling rails, long, Birming.	37.50 to 38.50
Locomotive tires, Chgo.	44.00 to 45.00

(Net Tons)

Locomotive tires, St. Louis	39.50 to 40.00